United States
Department of
Agriculture

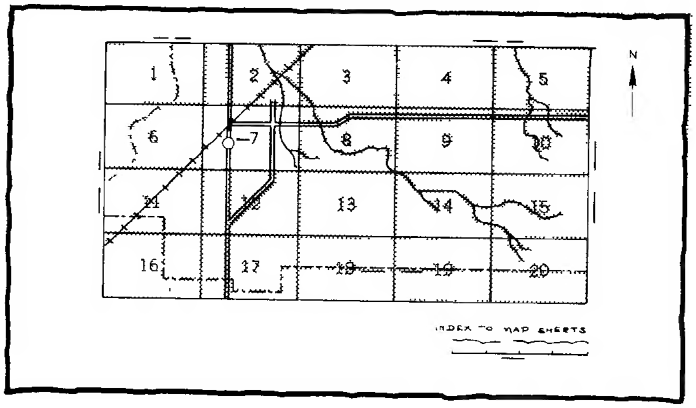
Soil
Conservation
Service

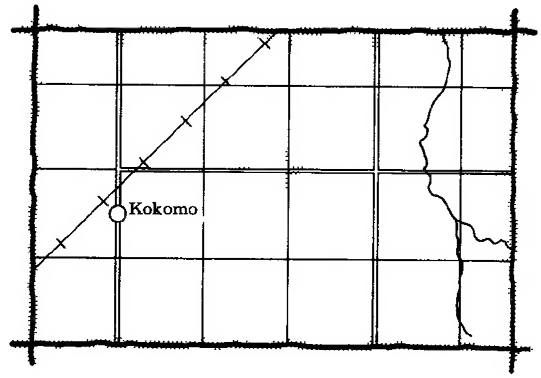
In Cooperation with
United States Department
of Agriculture,
Forest Service, and
University of California
Agricultural Experiment
Station

Soil Survey of Siskiyou County California Central Part

HOW TO USE

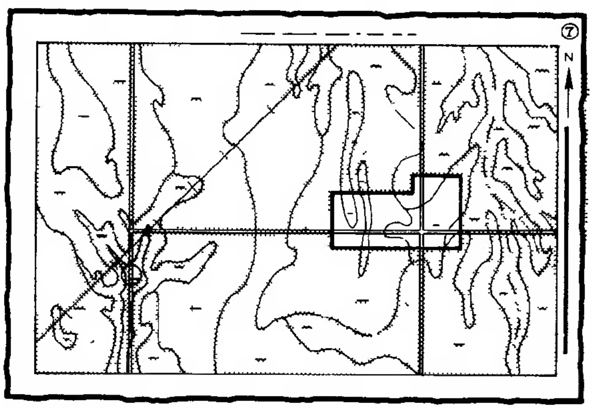
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

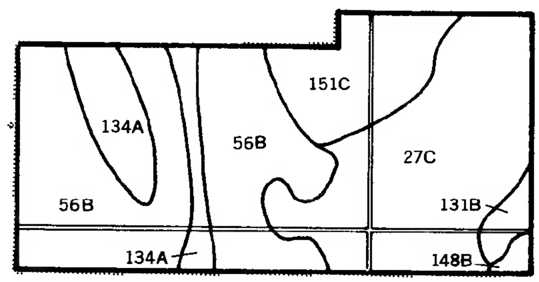




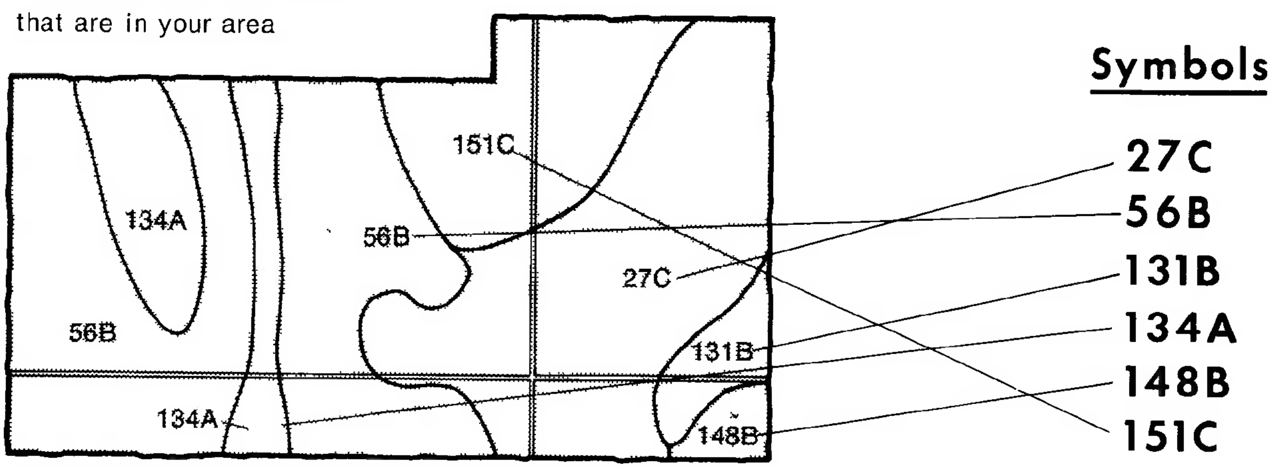
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



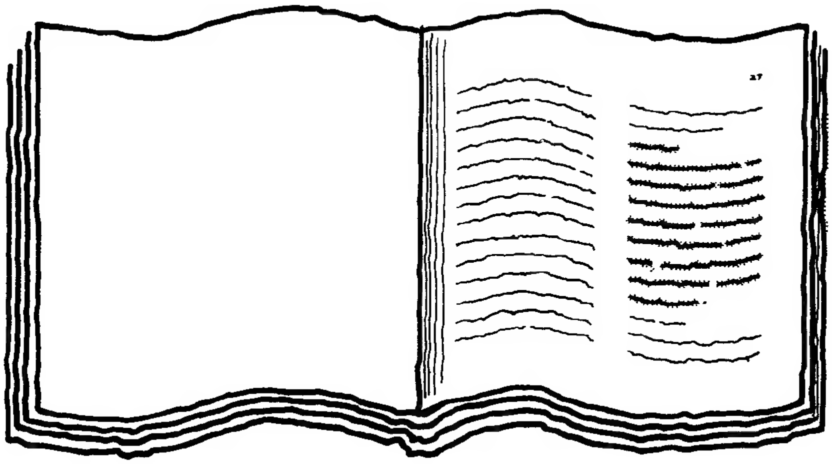


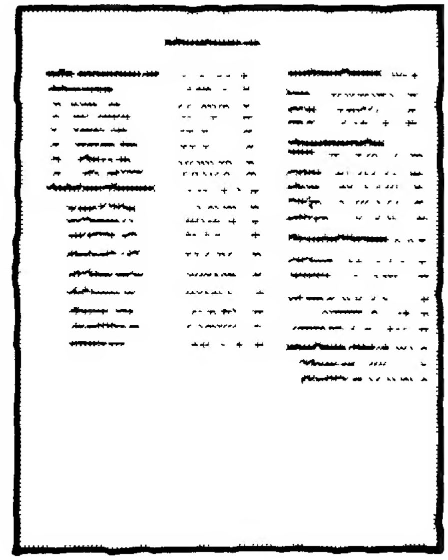
4. List the map unit symbols that are in your area



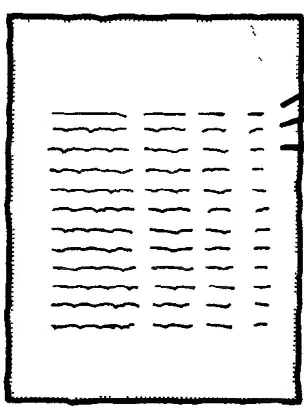
THIS SOIL SURVEY

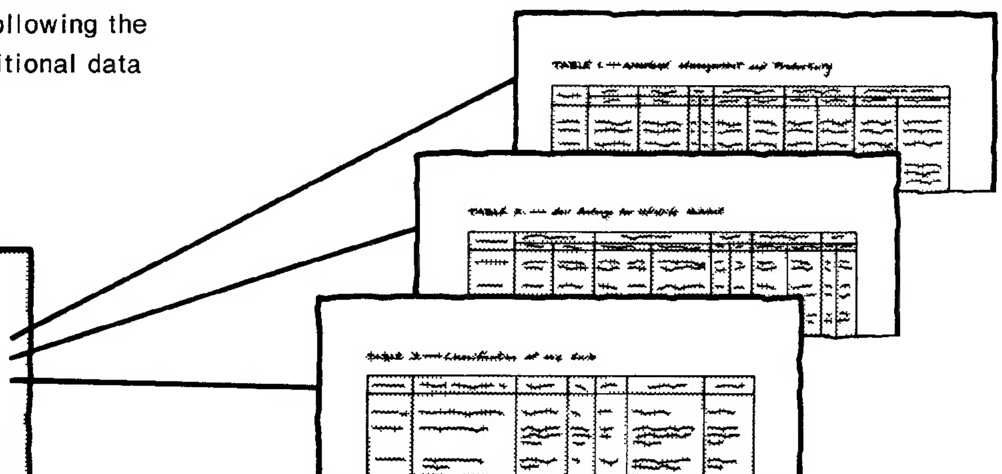
5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.





6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.





7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1962-76. Soil names and descriptions were approved in 1978. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the University of California Agricultural Experiment Station. It is part of the technical assistance furnished to the Shasta Valley and Siskiyou Resource Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Typical landscape in the survey area. The bales of straw are on Lassen soils. Lassen, Kuck, and Mary soils are in the background. Mt. Shasta is in the far background.

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soil series

Issued August 1983

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preface

This soil survey contains information that can be used in land-planning programs in Siskiyou County, California, Central Part. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Location of Siskiyou County, Central Part, in California

soil survey of
Siskiyou County, California Central Part

By Jesse J. Newlun, Wesley C. Lindsey, Joseph J. Jahnke, and Larry A. Day, Soil Conservation Service

Fieldwork by Jesse J. Newlun, Theodore A. Klassen, Donald L. Lucas, Joseph J. Jahnke, Gregory R. Lang, and Judy L. Weiss, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with University of California Agricultural Experiment Station

SISKIYOU COUNTY, CENTRAL PART, is in the northern part of California. The survey area is 887,765 acres, or about 1,387 square miles in size. It is bordered on the west by the Klamath National Forest, on the south by the Shasta-Trinity National Forest, on the east by the Klamath National Forest, and on the north by the State of Oregon.

An older survey, "The Shasta Valley Area," was published in 1923 (*11*). This earlier survey covers a part of the present survey. The present survey, however, updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey area.

general nature of the survey area

This section provides general information about the survey area. It discusses history and development; population trends; physiography, relief, and drainage; climate; water supply; and vegetation.

history and development

The first exploration of the survey area on record was in the late 1820's, when a party of trappers representing the Hudson's Bay Company entered the area in search of pelts. Cattle drovers, trailing cattle from the Sacramento Valley to the Oregon settlements, soon followed. Except for an occasional small military mission, these were about the only explorers to enter the area until the 1849 Gold Rush.

Gold was discovered near the present town of Yreka by Abraham Thompson in 1851. Other discoveries in the area soon followed (*5*). The strikes on the Scott, Klamath, and Salmon Rivers and those near the towns of Callahan, Greenhorn, Deadwood, Hawkinsville, and Henley are the most notable. By 1852 the population had increased greatly. Not only miners, but businessmen, farmers, cattlemen, and craftsmen came to share in the wealth. The farmers raised vegetables, hay, and grain to meet the needs of the miners. Cattlemen used the grasslands and adjacent timberlands for livestock grazing. Their herds increased rapidly, as did the market for livestock.

The miners, farmers, and townspeople needed lumber. Early forest products were used in mining and for buildings. The lumbering industry has grown steadily since the arrival of the first settlers. Approximately 76 sawmills have operated in the survey area over the years. Originally, logging was done exclusively with man and animal power. Logs were cut by manpowered

crosscut saws and were dragged by animals or floated down streams to sawmills. After the advent of the railroad in the 1880's, many lumber companies switched to logging by train. At one time there were as many as 559 miles of logging railroads in Siskiyou County. After World War II, crawler tractors and trucks became a more economical way of transporting logs.

As the Gold Rush "boom" waned, the agricultural, lumbering, and mining industries were becoming firmly entrenched in the economic fabric of the survey area.

The town of Montague was founded in 1887 by L. D. Norton, who was an assistant engineer with the Southern Pacific Railroad. Norton was sent to this area to start a town along the railroad. The town was named in honor of W. W. Montague, who for many years was a civil engineer with the Central and Southern Pacific Railroads (*14*).

In the fall of 1951 the name of the town near the gold strike at Thompson's Dry Diggins was changed to Shasta Butte City. In order to avoid confusion with Shasta City, the name was later changed to Yreka. On April 21, 1857, the city of Yreka was legally incorporated. Yreka then became the county seat. Siskiyou County, as it now exists, was created in 1874 by the state legislature (*6*).

population trends

The population of the county has grown steadily. It climbed from 30,768 in 1965 to 33,231 in 1970 (*10*).

Yreka is the main urban center in the survey area. Minor urban centers are Grenada, Montague, Etna, Mount Shasta, Weed, and Fort Jones. The population of Yreka increased from 5,057 in 1965 to 5,515 in 1970. The percentage of the population that lives in urban centers is constantly increasing. In 1930 only 4 percent of the population of Siskiyou County lived in urban areas, but by 1965 it had expanded to 33 percent. A great many of the people leaving Siskiyou County are the young people who were born and raised there. They leave for higher education and improved job opportunities.

physiography, relief, and drainage

Shasta Valley is in the central part of the survey area. To the west of this valley is Scott Valley. The Klamath Mountain Range is on the west side of Scott Valley, and the Cascade Range is on the east side of Shasta Valley. The entire area is bordered on the north by the Siskiyou Mountains.

Shasta and Scott Valleys consist of young alluvial fans and old terraces. Shasta Valley is dotted with small hills. It is about 28 miles long and averages 10 miles in width. Scott Valley is about 20 miles long and 4 miles wide.

The highest elevations in the area are in the southeastern part. Goosenest Mountain has the highest elevation—8,298 feet. The lowest point in the area, about 2,000 feet in elevation, is at the north end of Shasta Valley.

The principal drainage outlets in the area are the Shasta and Scott Rivers, both of which drain into the Klamath River. Drainage in both Shasta and Scott Valleys is from south to north.

climate

Prepared by the National Climatic Center, Asheville, North Carolina

The climate of Siskiyou County, Central Part, is greatly tempered by winds from the Pacific Ocean. Summers are fairly warm, but hot days are rare. Winters are cool, but snow and freezing temperatures are uncommon except at the higher elevations. Rainfall is extremely light in summer, so crops growing actively during this period need irrigation. Several weeks often pass without precipitation. During the rest of the year rains are frequent, especially late in fall and in winter.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Fort Jones, Mount Shasta, and Yreka, California, for the period 1951 to 1977. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature at Fort Jones, Mount Shasta, and Yreka is 36 degrees F. The average daily minimum temperature is 25 degrees at Fort Jones, 27 degrees at Mount Shasta, and 26 degrees at Yreka. The lowest temperature on record, -20 degrees, occurred at Fort Jones on January 22, 1962. In summer the average temperature is 67 degrees at Fort Jones, 65 degrees at Mount Shasta, and 69 degrees at Yreka. The average daily maximum temperature is about 85 degrees. The highest recorded temperature, which occurred at both Fort Jones and Yreka on August 8, 1972, is 108 degrees.

Every few years, either in winter or summer, an invasion of a large continental airmass from the east causes abnormal temperatures. In winter several consecutive days are well below freezing; in summer a week or longer is sweltering.

Growing degree days, shown in table 1, are equivalent to heat units. During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 23 inches at Fort Jones, 37 inches at Mount Shasta, and 19 inches at Yreka. Of this, 20 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of record was 5.07 inches at Mount Shasta on January 15, 1974. Thunderstorms occur on about 7 days each year, and most occur in summer.

Average seasonal snowfall is 30 inches at Fort Jones, 123 inches at Mount Shasta, and 24 inches at Yreka. The greatest snow depth at any one time during the period of record was 23 inches at Fort Jones, 54 inches at Mount Shasta, and 40 inches at Yreka. On the average, 10 days at Fort Jones and Yreka and 28 days at Mount Shasta have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 70 percent.

In most winters, one or two storms over the whole area bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding.

water supply

Water in this soil survey area is available from streams, reservoirs, springs, and wells. Quality of water is fair to good. Runoff from rainfall and snowfall in the Cascade, Siskiyou, and Klamath Mountains is the main source of water. The Shasta and Scott Rivers along with Dwinell Reservoir provide most of the surface water used for irrigation (*4*).

Water is provided throughout the area by many irrigation districts. The largest district, the Montague Water Conservation District, provides water from Dwinell Reservoir to irrigate more than 5,800 acres in Shasta Valley.

Ground water provides a small percentage of the water used for irrigation and domestic use in the area. The ground water is replenished by the deep percolation of direct precipitation and by seepage from streams and excess irrigation water in the area. The water supply in Shasta Valley is derived principally from precipitation and snowmelt from Mount Shasta (*3*).

There are several problems with the water supply in the area. The most serious one is the lack of sufficient water along the Scott River in summer. At times it is necessary to pump ground water near the river to provide water for irrigation.

vegetation

The natural vegetation in the survey area is broadly classified into four types: grassland, brushland, grazable woodland, and woodland. Soil and climate are important factors that determine the type and extent of natural vegetation. Within each of the four categories there are intergrades and variations in species composition. The principal variation is in the percentage of shrubby species present.

During recent and historical times, the original vegetative pattern of the survey area has undergone major alterations, which have contributed to soil erosion. The principal causes of these alterations have been cultivation, excessive grazing, and fire.

About 50 percent of the survey area was originally grassland. About 25 percent of the grassland is now used for grazing, and the rest is under cultivation or has been converted to other uses, such as urban development and roads. Heavy grazing pressure and the widespread droughts of the 1860's have reduced the extent of the native perennial grasses. Various species of annual grasses and forbs are now significant components of the vegetation on many range sites. Because of the climate in the survey area, however, perennial grasses such as bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and bottlebrush squirreltail are still dominant on well managed rangeland.

The soils between Shasta and Scott Valleys have a poor calcium-to-magnesium ratio and thus produce more brush than do any of the other soils in the area. The soils that are shallow or rocky, or both, and are in association with deeper soils also produce shrubby species such as manzanita and buckbrush. The clayey soils at the north end of Shasta Valley currently support a mixed plant community of scrubby oak trees, ceanothus shrubs, and both perennial and annual grasses. The better managed rangeland of this area is still dominated by perennial grasses.

The main areas of rangeland are around the perimeters of Scott and Shasta Valleys. Originally, both of these valleys were open grassland, but they have been converted to cropland in recent times. About 5 percent of the more sloping soils around the edges of these valleys have also been cleared of grass and shrubs and are used for dryland crops.

Grazable woodland occupies about 15 percent of the survey area. Areas of grazable woodland are dominantly between the open grassland areas at the lower elevations and the woodland areas at the higher elevations. In these areas, the vegetation consists of mixed conifers, oaks, shrubs, and grasses. The open tree canopy permits enough sunlight to reach the understory plants to provide some forage for livestock and wildlife. The understory on some of the soils is mainly shrubs such as ceanothus and manzanita. The deeper soils, however, produce abundant grass. The most common grasses are bluebunch wheatgrass, Idaho fescue, mountain brome, and Thurber needlegrass.

Woodland is on the uplands throughout the survey area. About 34 percent of the soils are classified as woodland soils. Typical trees include western juniper, on the foothills; predominantly ponderosa pine, at elevations of less than 3,000 feet; mixed conifers, ponderosa pine, sugar pine, Douglas-fir, white fir, and incense-cedar, between elevations of about 3,000 and 6,000 feet; and California red fir, at the higher elevations—above 6,000 feet. The higher elevations are in the Cascade Mountain Range, which makes up the eastern boundary of the survey area.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The 13 general map units in this survey have been grouped into four general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

map unit descriptions

Soils on flood plains, in basins, and on terraces, alluvial fans, and glacial outwash fans

Five map units are in this group. They make up about 24 percent of the survey area.

The soils in this group include nearly all of the land in Shasta and Scott Valleys. The alluvial fans are young. They consist of a sequence of narrow to broad areas of deposits of material washed from the Cascade and Klamath Mountains by rivers and streams. The older landforms occur as terraces above the streams from which they were deposited. The soils are nearly level to moderately steep. Elevation ranges from about 2,000 feet along the Shasta River to about 4,500 feet near the Cascade and Klamath Mountains.

These soils are moderately deep to very deep and are very poorly drained to somewhat excessively drained. The surface layer ranges from sand to silt loam that includes cobbles and stones in some areas.

These soils are used mainly for hay and pasture. Some areas are used as rangeland, and some are used for the production of wheat or barley. A few small areas are used for urban development.

1. Settlemeyer-Diyou

Very deep, nearly level and gently sloping, poorly drained and somewhat poorly drained loams; on flood plains

This map unit is along the Scott and Shasta Rivers in the southwestern and central parts of the survey area. The soils in this unit typically have a high water table or are subject to flooding, or both, because of the high rainfall and snowmelt in winter and spring. They formed in medium textured to moderately fine textured alluvium derived from mixed rock sources. Elevation ranges from 2,000 to 4,000 feet. The average annual precipitation ranges from 15 to 18 inches, and the average annual air temperature is about 50 degrees F. The average frost-free season is about 125 days.

This unit makes up about 6 percent of the survey area. It is about 30 percent Settlemeyer soils and 27 percent Diyou soils. The remaining 43 percent is components of minor extent.

Settlemeyer soils are on flood plains south of Fort Jones and south of Gazelle. These soils have slopes of 0 to 5 percent. They are poorly drained. Typically, they have a stratified loam, fine sandy loam, silt loam, and sandy clay loam profile.

Diyou soils are mainly on flood plains in Scott Valley, south of Fort Jones. These soils have slopes of 0 to 2 percent. They are somewhat poorly drained. Typically, they have a stratified loam, sandy loam, sandy clay loam, and clay loam profile.

Of minor extent in this unit are the poorly drained Copsey, Odas, Pit, and Settlemeyer Variant soils, the very poorly drained Esro soils, the well drained Bonnet soils, the somewhat excessively drained Deetz soils, Xerofluvents, and Riverwash. Copsey, Odas, Pit, and Settlemeyer Variant soils are along small streams on the higher positions on the landscape. Esro soils are in basins. Bonnet and Deetz soils are on the higher positions on the landscape. Xerofluvents and Riverwash are variable in texture and are on the lower positions on the landscape.

Areas of this unit are mainly used for irrigated hay and pasture. A few areas are used for irrigated and nonirrigated wheat and barley. The main limitations for these uses are the seasonally high water table and the hazard of flooding. Drainage can be provided by using tile systems to intercept water from higher lying areas. Irrigation water must be applied carefully to avoid raising the water table.

This unit provides excellent habitat for wildlife such as black-tailed deer, doves, ring-necked pheasant, California quail, ducks, geese, songbirds, and birds of prey. Areas that have water at or near the surface can provide shallow water areas that can be developed for waterfowl habitat.

Permanent vegetation such as berry vines and roses left or planted along ditches and streambanks and other areas near cultivated crops provide food and cover for wildlife. Pasture management practices helpful to wildlife include delaying mowing until after the nesting season and growing plants that provide food and cover.

2. Gazelle

Moderately deep, nearly level, very poorly drained silt loams that are underlain by a hardpan; in basins

This map unit is in the central part of Shasta Valley, in an area south and east of Montague. The soils are saline-alkali. They formed in medium textured alluvium derived from mixed rock sources. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, and the average annual air temperature is about 50 degrees F. The average frost-free season is about 125 days.

This unit makes up about 2 percent of the survey area. It is about 97 percent Gazelle soils. The remaining 3 percent is soils of minor extent.

Gazelle soils have slopes of 0 to 2 percent. Typically, they are silt loam about 25 inches thick over a calcium- and silica-cemented hardpan.

Of minor extent in this unit are the well drained Salisbury soils on terraces and older alluvial fans at the higher elevations on the landscape.

This unit is used mainly as rangeland or for irrigated pasture and hay. The main limitations for these uses are shallow soil depth, a perched water table, and a slight concentration of salts and sodium. The hardpan limits the depth to which roots can penetrate and creates a perched water table. The concentration of salts and sodium in the surface layer limits the production of plants suitable for pasture.

This map unit can provide excellent habitat for black-tailed deer, ring-necked pheasant, California quail, doves, ducks, geese, songbirds, and birds of prey. Permanent vegetation such as berry vines and roses left or planted along ditches and streambanks and other areas near cultivated crops provide food and cover for wildlife. Delaying mowing until after the nesting season and growing plants that provide food and cover are also beneficial. Shallow water areas can be developed for waterfowl habitat.

3. Salisbury-Louie

Moderately deep, nearly level to strongly sloping, well drained cobbly loams and stony loams that are underlain by a hardpan; on terraces

This map unit is in Shasta Valley, in the central part of the survey area. The soils in this unit formed in moderately coarse textured to moderately fine textured alluvium derived from mixed rock sources. Elevation ranges from 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature ranges from 48 to 50 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 8 percent of the survey area. It is about 42 percent Salisbury soils and 25 percent Louie soils. The remaining 33 percent is components of minor extent.

Salisbury soils are mainly on terraces north and south of Montague. These soils have slopes of 0 to 9 percent. Typically, they have a cobbly loam surface layer and a cobbly loam and gravelly clay loam subsoil that is underlain by a silica-cemented hardpan.

Louie soils are mainly on terraces south of Montague. These soils have slopes of 0 to 15 percent. Typically, they have a stony loam surface layer and a cobbly loam and cobbly sandy clay loam subsoil that is underlain by a silica-cemented hardpan.

Of minor extent in this unit are Montague, Medford, and Jenny soils and Rock outcrop. The Montague soils are clay throughout and have a lime-cemented hardpan. The Medford and Jenny soils are very deep. They are on the higher positions on stream terraces and alluvial fans. Rock outcrop is mainly extrusive igneous rock.

Areas of this unit are mainly used as rangeland or for cultivated crops. A few small areas are used for irrigated pasture and urban development.

If the hardpan is ripped, the soils in this unit are suited to most crops grown in the area. They are not well suited to nonirrigated crops because of the small amount and irregular pattern of precipitation.

This unit is moderately suited to livestock grazing. Forage production is limited by low precipitation. Brush management and stock water development are essential.

This unit can provide good habitat for rangeland wildlife. It supports habitat for black-tailed deer, ring-necked pheasant, doves, and California quail. Pasture and range management practices that are helpful to wildlife include grazing within the carrying capacity of the pasture or range, brush management, stock water development, and protection from uncontrolled burning. Permanent vegetation left or planted along fence rows, ditchbanks, and in corners of fields also provides food and cover for wildlife.

4. Stoner-Dotta

Very deep, nearly level to strongly sloping, well drained, gravelly sandy loams and loams; on alluvial fans

This map unit is along the streams and rivers that drain into Scott Valley and into the western side of Shasta Valley. The soils in this unit formed in moderately coarse textured and medium textured alluvium derived

from mixed rock sources. Elevation ranges from 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 5 percent of the survey area. It is about 39 percent Stoner soils and 17 percent Dotta soils. The remaining 44 percent is soils of minor extent.

Stoner soils are mainly on alluvial fans in Scott Valley and along the western side of Shasta Valley. These soils have slopes of 0 to 15 percent. Typically, they have a gravelly sandy loam surface layer and a gravelly sandy loam and very gravelly loam subsoil.

Dotta soils are on alluvial fans on the western side of Shasta Valley. These soils have slopes of 0 to 9 percent. Typically, they have a loam surface layer. The subsoil is clay loam and sandy clay loam underlain by sandy clay loam.

Of minor extent in this unit are the somewhat excessively drained Atter soils and the well drained Bonnet, Duzel, Kinkel, and Kindig soils. The Atter soils have many rock fragments on the surface and throughout the profile. The Bonnet soils are on the lower positions on the landscape and have a layer of lime accumulation. The Duzel, Kinkel, and Kindig soils have steeper slopes than the Stoner and Dotta soils and are on the higher positions on the landscape.

This unit is mainly used for cultivated crops, hay, and pasture. The main cultivated crops are wheat and barley. A few small areas are used as rangeland and for urban development.

The soils in this unit have few limitations for most crops grown in the area. The hazard of erosion is the main concern where slopes are more than 2 percent. In a few areas the Stoner soils are limited by the rock fragments on the surface and in the profile.

Areas of this unit provide good habitat for upland wildlife such as ring-necked pheasant, doves, and California quail. Cropland management practices helpful to wildlife include using crop rotations that include grass-legume mixtures; delaying mowing of roadsides, areas along watercourses, and field borders until after the nesting season or harvest; leaving small areas of standing grain near good cover; planting "odd areas" to plants that provide food and cover; and planting hedgerows and windbreaks.

5. Delaney-Plutos

Moderately deep to very deep, nearly level to moderately steep, somewhat excessively drained sands and loamy sands; on glacial outwash fans

This map unit is in the southwestern part of the survey area, west of Gazelle. It is on toe slopes at the northern base of Mount Shasta. The soils in this unit formed in coarse textured alluvium derived from extrusive igneous rock and volcanic ash. Elevation ranges from 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 3 percent of the survey area. It is about 37 percent Delaney soils and 18 percent Plutos soils. The remaining 45 percent is components of minor extent.

Delaney soils are deep or very deep. Slope is 0 to 15 percent. Typically, the surface layer and substratum are sand.

Plutos soils are moderately deep. Slope is 0 to 30 percent. Typically, the surface layer is loamy sand, and the substratum is sand over hard basalt.

Of minor extent in this unit are well drained Redola, Uhlig Variant, and Delaney Variant soils, somewhat excessively drained Deetz soils, and Rock outcrop. The Uhlig Variant soils are on uplands. Deetz soils are on the higher positions on the landscape. The Delaney Variant soils do not have bedrock or strongly contrasting material within a depth of 80 inches. Rock outcrop is mainly extrusive igneous rock.

This unit is used mainly as rangeland. A few areas are used for cultivated crops.

The soils in this unit are suited to only the most drought resistant plants because of low or very low available water capacity, low rainfall, and the high hazard of soil blowing. The production of forage on these soils is limited by the coarse soil texture, rock fragments scattered on the surface, and the predominance of shrubs and juniper in the plant community.

Areas of this unit provide excellent habitat for rangeland wildlife. Black-tailed deer, coyotes, rockchucks, quail, chukar, jackrabbits, and songbirds are the main kinds of wildlife on this unit. Water development and brush management are essential for deer and upland wildlife. Areas of Rock outcrop are used by rockchucks and cliff-nesting birds. The unit provides winter range for deer.

Soils on lower foothills of the Cascade Mountain Range

This group consists of one map unit. It makes up about 20 percent of the survey area.

The soils in this group include all of the land extending from the western edge of the Cascade foothills up to areas along the Cascade Mountain Range. The eastern boundary is determined by the elevation, shape, and aspect of the land surface, which, in turn, controls the local climate and the local development of the soils. The soils in this group are warmer and drier than the soils in the Cascade Mountains. Elevation ranges from 2,000 to 4,500 feet.

These soils are moderately deep and well drained. The surface layer ranges from stony loam to clay.

These soils are mainly used as rangeland. A few areas are used for cultivated crops.

6. Lassen-Kuck-Mary

Moderately deep, gently sloping to steep, well drained clays, clay loams, and stony loams; on foothills

This map unit is on toe slopes of the Cascade Mountain Range, in the eastern part of the survey area. The soils formed in medium textured, moderately fine textured, and fine textured material derived from extrusive igneous rock. Elevation ranges from 2,000 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 20 percent of the survey area. It is about 32 percent Lassen soils, 20 percent Kuck soils, and 18 percent Mary soils. The remaining 30 percent is components of minor extent.

Typically, the Lassen soils have a surface layer of clay and a substratum of gravelly clay underlain by volcanic rock.

Kuck soils have a surface layer of clay loam. The subsoil is clay loam, clay, and gravelly clay loam and is underlain by weathered volcanic rock.

Mary soils have a surface layer of stony loam. The subsoil is loam, clay loam, and sandy clay loam and is underlain by weathered volcanic rock.

Of minor extent in this unit are the well drained Bogus, Deven, Hilt, Pinehurst, Terwilliger, and Pinehurst Variant soils; moderately well drained Medford soils; Lithic Haploxerolls; and Rock outcrop. The Bogus, Pinehurst, and Pinehurst Variant soils are forested and are at the higher positions on the landscape. The Hilt soils are underlain by sandstone and have a moderately coarse textured surface layer. The Deven soils and Lithic Haploxerolls are less than 20 inches deep. The Medford soils are very deep. The Terwilliger soils have a fine textured subsoil and are underlain by siltstone. The Rock outcrop consists of extrusive igneous rock.

This unit is mainly used as rangeland and for dryland pasture. A few areas are used for cultivated crops.

The soils in this unit are suitable for use as rangeland. The hazard of erosion is the main limitation. Where slopes are more than 30 percent, access by livestock is limited and overgrazing of the less sloping areas occurs. This unit is poorly suited to nonirrigated crops because of the small amount and irregular pattern of precipitation.

Cropland on this unit can support good habitat for such upland game birds as ring-necked pheasant, California quail, and dove. Cropland management practices helpful to wildlife are crop rotations that include grass and legume mixtures; use of cover crops; delaying mowing of roadsides, areas along watercourses, and field borders until after the nesting season or harvest; plowing in spring; leaving 1/8- to 1/4-acre of standing grain near good cover; planting "odd areas" to plants that provide food and cover; and planting hedgerows and windbreaks.

Range or dryland pasture conservation management practices that benefit wildlife include grazing within the carrying capacity of the soils, developing livestock watering facilities, proper placement of salt, and providing protection from uncontrolled fire. This unit is traversed in places by perennial streams that support riparian vegetation. A few springs are on this unit. The unit provides winter range for deer.

Soils of the Cascade Mountain Range

Three map units are in this group. They make up about 12 percent of the survey area.

The soils in this group include all land extending from the eastern edge of the lower foothills to the eastern boundary of the survey area. The western boundary of this group is not sharply defined and is dependent upon aspect or the protective influence of prominent outlying hills and ridges in the lower foothills. The western boundary is approximately where the woodland begins. Elevation dominantly ranges from 2,700 to 7,500 feet.

These soils are moderately deep to very deep and are well drained or somewhat excessively drained. The surface layer ranges from loam to loamy sand and is gravelly, stony, or very stony in places.

These soils are used mainly as woodland. A few areas are used for limited grazing.

7. Pinehurst-Bogus

Deep and very deep, gently sloping to steep, well drained stony loams; on mountains

This map unit is in the Cascade Mountains, in the northeastern part of the survey area. The soils in this unit formed in medium textured, moderately fine textured, and fine textured material weathered from extrusive igneous rock. Elevation ranges from 3,500 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is about 90 days.

This unit makes up about 4 percent of the survey area. It is about 59 percent Pinehurst soils and 20 percent Bogus soils. The remaining 21 percent is components of minor extent.

The Pinehurst soils are deep. Slope is 2 to 50 percent. The surface layer is stony loam. The subsoil is gravelly loam, gravelly clay loam, and very stony clay loam and is underlain by weathered extrusive igneous rock.

The Bogus soils are very deep. Slope is 15 to 50 percent. The surface layer is stony loam. The subsoil is clay loam, clay, and sandy clay and is underlain by weathered tuff.

Of minor extent in this unit are Avis, Iller, Sheld, and Pinehurst Variant soils and Rock outcrop. Avis, Iller, and Sheld soils are moderately coarse textured. They are at the higher elevations in the unit. Pinehurst Variant soils are 20 to 40 inches deep over bedrock and are at the lower elevations. Rock outcrop is mainly extrusive igneous rock.

This unit is used mainly for woodland. Some areas are used for livestock grazing.

The soils in this unit are well suited to timber production. On steep slopes the hazard of erosion is a severe limitation. Conventional harvesting methods can be used, but they may be restricted from November to June because of wetness or snow. The soils are limited for road construction and logging because of large stones, boulders, and areas of Rock outcrop. Reduction of plant competition after harvesting helps to insure seedling survival.

Time and intensity of grazing by livestock and wildlife markedly influence the production and composition of the plant community. Excessive use of browse and forage by deer and livestock lowers the potential for forage production and can damage browse plants and reduce tree reproduction in reforested areas.

This unit can produce excellent habitat for wildlife species that seasonally or permanently inhabit woodland areas. Black-tailed deer, black bear, mountain lion, porcupine, raccoon, bobcat, coyote, blue grouse, gray squirrels, chipmunks, mountain quail, band-tailed pigeon, jays, doves, woodpeckers, and many songbirds use the unit. The unit is traversed by perennial streams that support riparian vegetation.

Woodland management practices that benefit wildlife are providing protection from uncontrolled fires, proper grazing use, selective cutting of woodland, leaving den trees when harvesting, piling brush near the edge of wooded areas, leaving fallen hollow logs, and clearcutting small areas of dense woodland.

8. Avis-Sheld-Iller

Very deep and deep, moderately sloping to very steep, well drained and somewhat excessively drained very stony sandy loams and stony sandy loams; on mountains

This map unit is in the Cascade Mountain Range, in the eastern part of the survey area. The soils in this unit have been influenced by volcanic ash from recent volcanic activity. Most areas of the Sheld and Iller soils are near Miller Mountain. The Avis soils are near Goosenest Mountain. The soils in this unit formed in moderately coarse textured material derived from volcanic ash deposited over areas of extrusive igneous rock. Elevation ranges dominantly from 4,500 to 7,500 feet. A small area on Goosenest Mountain is at a height of about 8,300 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free season is about 50 days.

This unit makes up about 5 percent of the survey area. It is about 28 percent Avis soils, 23 percent Sheld soils, and 16 percent Iller soils. The remaining 33 percent is components of minor extent.

The Avis soils are very deep and somewhat excessively drained. Slope ranges from 5 to 50 percent. The surface layer is very stony sandy loam. The underlying material is very gravelly loamy sand and very gravelly sand.

The Sheld soils are deep and well drained. Slope ranges from 9 to 65 percent. The surface layer is stony sandy loam. The subsoil is very gravelly sandy loam and very gravelly loam that is underlain by weathered andesite.

The Iller soils are very deep and well drained. Slope ranges from 9 to 50 percent. The surface layer is stony sandy loam. The subsoil is sandy loam, very stony sandy loam, and extremely stony loam.

Of minor extent in this unit are Lava flows; Odas, Oosen, Orset, and Pinehurst soils; Rock outcrop; and Snell soils. Oosen soils are somewhat excessively drained and have few rock fragments in the profile. Lava flows consists of basalt or andesite. Odas soils are poorly drained and are on flood plains. Orset soils are well drained and are on terraces of streams and in basins. Pinehurst soils are well drained and are at the lower elevations in the unit. Rock outcrop is mainly extrusive igneous rock. Snell soils are well drained and moderately deep.

This unit is used mainly as woodland.

The soils in this unit are suited to timber production. The hazard of erosion is high on the steeper slopes. Conventional harvesting methods can be used, but they may be restricted from November to June because of wetness or snow. The soils are limited for road construction and logging because of the large stones, boulders, and areas of Rock outcrop. Reduction of plant competition after harvesting helps to insure seedling survival.

Areas of this unit can produce excellent habitat for wildlife that seasonally or permanently inhabit woodland areas. Black-tailed deer, black bear, mountain lion, porcupine, raccoon, bobcat, coyote, blue grouse, gray squirrels, chipmunks, mountain quail, band-tailed pigeon, jays, doves, woodpeckers, and many songbirds use this unit. Deep snow and cold weather limit the use of the unit for wildlife habitat in winter. This unit is traversed by perennial streams that support riparian vegetation.

Woodland management practices that encourage wildlife include protection from uncontrolled fires, proper grazing use, selective cutting of woodland, leaving den trees when harvesting, piling brush near edges of woodland, leaving fallen hollow logs, and clearcutting small areas of dense woodland.

9. Ponto-Deetz-Neer

Very deep and moderately deep, nearly level to steep, somewhat excessively drained and well drained sandy loams, gravelly loamy sands, and gravelly sandy loams; on mountains

This map unit is in the Cascade Mountain Range, in the southeastern part of the survey area. The Deetz soils are on glacial outwash fans, mainly west of Mount Shasta. The Neer and Ponto soils are on hills southwest of Mount Shasta. The soils formed in coarse textured and moderately coarse textured glacial outwash derived

from extrusive igneous rock. Elevation ranges from 2,700 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 3 percent of the survey area. It is about 25 percent Ponto soils, 24 percent Deetz soils, and 22 percent Neer soils. The remaining 29 percent is soils of minor extent.

Ponto soils are very deep and well drained. Slope ranges from 2 to 50 percent. The surface layer and subsoil are sandy loam. The substratum is stony sandy loam.

Deetz soils are very deep and somewhat excessively drained. Slope ranges from 0 to 30 percent. The surface layer is gravelly loamy sand, and the underlying material is gravelly loamy sand and very gravelly sand.

Neer soils are moderately deep and well drained. Slope ranges from 2 to 50 percent. The surface layer is gravelly sandy loam, and the subsoil is very gravelly sandy loam that is underlain by extrusive igneous rock.

Of minor extent in this unit are the well drained Asta, Boomer, Neuns, and Odas soils. Asta soils have a gravelly sandy loam surface layer and a subsoil of loam and silt loam. They are on glacial outwash terraces. Boomer soils are deep, have a gravelly clay loam subsoil, and are in the higher positions on the landscape. Neuns soils are moderately deep and have a gravelly loam surface layer and a very gravelly loam subsoil. They are on uplands. Odas soils are poorly drained and are on flood plains.

This unit is used mainly for woodland, livestock grazing, urbanization, and recreation. A few small areas are used for irrigated cropland.

Deetz soils have low to very low available water capacity, and Neer soils have very low available water capacity. These soils are suited only to the most drought resistant plants.

This unit is poorly suited to livestock grazing. The production of forage is limited by the very low to low available water capacity.

This unit can produce excellent habitat for woodland or rangeland wildlife. Black-tailed deer, black bear, porcupine, gray squirrel, band-tailed pigeon, woodpeckers, songbirds, and birds of prey are the main kinds of wildlife. In areas dominated by ponderosa pine, woodland management practices that provide food and cover for wildlife are fire protection, proper grazing use, selective cutting of small areas of woodland, leaving a few den trees, piling brush near the edge of areas of woodland, leaving fallen hollow logs, clearcutting small areas of dense woodland, and providing water for wildlife. Areas dominated by brush require brush management and the provision of water for wildlife. This unit provides winter range for deer.

Soils dominantly in the Klamath Mountain Range

Four map units are in this group. They make up about 44 percent of the survey area.

This group includes all mountainous areas west of Shasta Valley. The western and southern boundaries of the group are along the edge of the survey area. The soils in this group are nearly level to very steep. Elevation ranges from 2,000 to 6,000 feet.

These soils are very shallow to very deep and are well drained to excessively drained. The surface layer is loam to very gravelly loam.

These soils are used as woodland and rangeland.

10. Duzel-Jilson

Moderately deep and shallow, moderately sloping to very steep, well drained gravelly loams; on mountains

This map unit is in the western part of the survey area. It is in an area between Shasta Valley and Scott Valley. The soils in this unit formed in medium textured residuum derived from metamorphic rock. Elevation ranges from 2,200 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 17 percent of the survey area. It is about 36 percent Duzel soils and 33 percent Jilson soils. The remaining 31 percent is components of minor extent.

Duzel soils are moderately deep. Slope ranges from 5 to 50 percent. The surface layer is gravelly loam. The subsoil is gravelly loam and very gravelly clay loam and is underlain by metamorphic rock.

Jilson soils are shallow. Slope ranges from 5 to 65 percent. Typically, the surface layer is gravelly loam. The subsoil is gravelly loam and is underlain by metasedimentary rock.

Of minor extent in this unit are Facey and Marpa soils, Lithic Xerorthents, and Rock outcrop. Facey soils are deep. Marpa soils are on the higher positions on the landscape. Lithic Xerorthents are very shallow and are mainly on south-facing slopes. Rock outcrop is mainly metasedimentary rock.

This unit is used mainly as rangeland.

The Jilson soils are poorly suited to livestock grazing. The production of forage is limited by shallow rooting depth and very low available water capacity. The Duzel soils are suited to the production of forage for livestock. The hazard of erosion is the main limitation, especially where slope is more than 30 percent. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Shrubs on this unit compete with grasses and forbs for soil moisture.

This unit is dissected by a few perennial streams that support riparian vegetation. A few springs are in the unit.

This unit can produce excellent habitat for rangeland wildlife. The rangeland habitat consists of both dense

and open stands of buckbrush and manzanita, which are associated with grasses and forbs and occasional trees, mainly juniper. Water for wildlife may become scarce during dry periods. Black-tailed deer, bobcat, coyote, rabbits, birds of prey, band-tailed pigeon, doves, and various songbirds are the main kinds of wildlife on this unit. The unit is also part of the winter range for the local black-tailed deer population. Range management practices that are helpful to wildlife include grazing within the carrying capacity of the soils, brush management, fertilization, livestock water development, proper placement of salt, and protection from uncontrolled fires.

11. Marpa-Kinkel-Boomer

Moderately deep to very deep, gently sloping to very steep, well drained gravelly loams and very gravelly loams; on mountains

This map unit is in the western part of the survey area. It is in an area west and north of Scott Valley. The soils in the unit formed in medium textured residuum derived from metamorphic rock. Elevation ranges from 2,000 to 5,500 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is about 125 days.

This unit makes up about 14 percent of the survey area. It is about 23 percent Marpa soils, 23 percent Kinkel soils, and 18 percent Boomer soils. The remaining 36 percent is components of minor extent.

Marpa soils are moderately deep. Slope ranges from 5 to 50 percent. The surface layer is gravelly loam. The subsoil is very gravelly sandy clay loam and is underlain by fractured metasedimentary bedrock.

Kinkel soils are very deep. Slope ranges from 2 to 50 percent. The surface layer is very gravelly loam. The subsoil is very gravelly loam and is underlain by fractured metasedimentary bedrock.

Boomer soils are deep. Slope ranges from 5 to 70 percent. The surface layer is gravelly loam. The subsoil is gravelly clay loam and gravelly sandy clay loam and is underlain by metamorphosed basic igneous rock.

Of minor extent in this unit are Asta, Atter, Chaix, Chawanakee, Dubakella, Etsel, Ipish, Kindig, and Neuns soils; Rock outcrop; and Weitchpec Variant soils. Asta soils are on terraces. Atter and Chawanakee soils are somewhat excessively drained. Chaix soils are gravelly coarse sandy loam throughout the profile. Dubakella, Ipish, and Weitchpec Variant soils formed in residuum derived from serpentinitic rock. Etsel, Kindig, and Neuns soils are on the higher positions on the landscape and generally have steeper slopes than do the Marpa, Kinkel, and Boomer soils. Rock outcrop is mainly metasedimentary rock.

This unit is used mainly as woodland. A few areas are used for grazing and recreation.

The soils in this unit are suited to timber production. The main limitations are slope and the hazard of erosion, particularly in areas where slope is 30 percent or more. Conventional harvesting methods usually can be used, but they are restricted from November to June because of wetness or snow cover. Road construction and logging are limited by steepness of slope and the presence of large stones, boulders, and Rock outcrop. Reducing plant competition helps to insure seedling survival.

This unit has limited value for livestock grazing. The period and intensity of grazing by livestock and wildlife influence plant composition and production. Excessive use of browse and forage by deer and livestock reduces forage production. Excessive use and trampling also damage browse plants and reduce tree reproduction in reforested areas.

This unit can produce excellent habitat for wildlife species that seasonally or permanently inhabit woodland areas. The main wildlife species that use this unit include black-tailed deer, black bear, mountain lion, porcupine, raccoon, bobcat, coyote, blue grouse, mountain quail, band-tailed pigeon, gray squirrels, chipmunks, and many songbirds. Perennial streams and the associated riparian vegetation dissect the unit. Wet meadows and springs are throughout the unit. Deep snow and cold weather limit the use of the unit for wildlife habitat in winter. Critical winter range for deer is at the lower elevations in the unit.

Woodland management practices that help to develop and improve wildlife habitat include protection from uncontrolled fires, proper grazing use, selective cutting of woodland, leaving den trees when harvesting, piling brush near the edge of areas of woodland, leaving fallen hollow logs, and clearcutting small areas of dense woodland.

12. Kindig-Neuns

Deep and moderately deep, moderately steep to very steep, well drained gravelly loams; on mountains

This map unit is in the western part of the survey area. It is in an area northwest of Etna and in an area west of Hilt. The soils in this unit formed in medium textured residuum derived from metamorphic rock. They are among the steepest soils in the survey area. Elevation ranges from 2,000 to 6,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is about 100 days.

This unit makes up about 8 percent of the survey area. It is about 33 percent Kindig soils and 25 percent Neuns soils. The remaining 42 percent is components of minor extent.

Kindig soils are deep. The surface layer is gravelly loam. The subsoil is gravelly loam and very gravelly loam and is underlain by weathered schist.

Neuns soils are moderately deep The surface layer is gravelly loam. The subsoil is very gravelly loam and is underlain by hard metamorphosed siltstone.

Of minor extent in this unit are Asta, Atter, Boomer, Chaix, Chawanakee, Kinkel, and Marpa soils and Rock outcrop. The Asta and the Atter soils are on glacial outwash terraces and alluvial fans. The Boomer soils are deep and have a gravelly clay loam subsoil. The Chaix soils formed in material derived from granite and have a gravelly coarse sandy loam profile. The Chawanakee soils are somewhat excessively drained, and they formed in material derived from granitic rock. The Kinkel soils are very deep and have an increase of clay in the subsoil. The Marpa soils are moderately deep and have a very gravelly sandy clay loam subsoil. Rock outcrop consists of areas where more than 90 percent of the surface is exposed metasedimentary rock.

This unit is used mainly as woodland. Some areas provide limited grazing for livestock.

This unit is suited to timber production. Where slopes are very steep, the hazard of erosion is a severe limitation. Conventional methods of harvesting timber can be used, but their use may be restricted from November to June because of wetness or snow cover. The unit is limited for road construction and logging operations because of the very steep slopes and the presence of large stones, boulders, and areas of Rock outcrop. Reducing plant competition after harvesting helps to insure seedling survival.

This unit has limited value for livestock grazing. The time and intensity of grazing by livestock and wildlife influence plant composition and production. Excessive grazing reduces forage production. It can also damage browse plants and reduce tree reproduction in reforested areas because of trampling or the acceleration of the growth of undesirable understory plants.

This unit supports several types of wildlife habitat. The main wildlife species on the unit include black-tailed deer, black bear, mountain lion, porcupine, raccoon, bobcat, coyote, blue grouse, mountain quail, band-tailed pigeon, gray squirrels, chipmunks, and many songbirds. Deep snow and cold weather limit the use of the unit for wildlife habitat in winter. Perennial streams and associated riparian vegetation dissect the unit. Narrow wet meadows and springs are throughout the unit.

Woodland management practices that help to develop and improve wildlife habitat include protection from uncontrolled fires, proper grazing use, selective cutting of woodland, leaving den trees when harvesting, piling brush near the edge of woodland, leaving fallen hollow logs, and clearcutting small areas of dense woodland.

13. Rock Outcrop-Lithic Haploxerolls-Lithic Xerorthents

Rock outcrop, and very shallow, nearly level to very steep, excessively drained soils that are variable in texture; on mountains

This map unit is mainly in the Klamath Mountains. Lithic Xerorthents are mainly in the western part of the survey area. Lithic Haploxerolls are mainly in the eastern part of the survey area and in places are at the higher elevations. The soils formed in material weathered from intrusive igneous, extrusive igneous, sedimentary, or metamorphic rock. Elevation is dominantly 2,000 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is 48 degrees F, and the average frost-free season is 100 days.

This unit makes up about 5 percent of the survey area. It is about 32 percent Rock outcrop, 23 percent Lithic Haploxerolls, and 15 percent Lithic Xerorthents. The remaining 30 percent is components of minor extent.

Rock outcrop consists of exposures of bare intrusive and extrusive igneous, sedimentary, and metamorphic rock.

Lithic Xerorthents are very shallow, excessively drained soils that formed in residual material derived from intrusive igneous, sedimentary, or metamorphic rock.

Lithic Haploxerolls are very shallow, excessively drained soils that formed in residual material derived from extrusive igneous rock.

Of minor extent in this unit are Dumps; Deetz, Duzel, and Jilson soils; and Lava flows. Dumps consists of uneven piles of waste rock from mines, quarries, and dredging operations. It is mainly gravel, cobbles, and stone-sized rock fragments. The Deetz soils are very deep gravelly loamy sand and very gravelly sand that formed in glacial outwash derived from extrusive igneous rock. The Duzel soils are moderately deep gravelly loam that formed in material derived from metamorphic rock. The Jilson soils are shallow, well drained gravelly loam derived from metasedimentary rock. Lava flows has sharp jagged surfaces, crevices, and expansion ridges of basalt or andesite that has fractured into angular blocks of cobble, stone, and boulder size.

This unit is used mainly for wildlife habitat. Black-tailed deer graze areas of the unit where vegetation is available. The major soils in this unit have very low available water capacity and very shallow depth; therefore, they are suited to only the most drought resistant plants. Sparse stands of grasses and shrubs as well as scattered juniper are mainly on the Lithic Xerorthents and Lithic Haploxerolls in the unit. These plants provide little forage or browse for livestock and wildlife. The steepness of slope and the rugged terrain also limit access by livestock and wildlife. Availability of drinking water is limited during dry seasons. Birds of prey and other cliff-nesting birds may nest in areas of Rock outcrop.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Each description is followed by a capability grouping and a land resource area designation (in parentheses). These are explained in the sections "Capability classes and subclasses" and "Land resource areas.".

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Delaney sand, 0 to 9 percent slopes, is one of several phases in the Delaney series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Avis-Oosen complex, 5 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

This survey was mapped at two levels of intensity, or detail. The more detailed part is identified by narrowly defined units, and the less detailed part is identified by broadly defined units. In the narrowly defined units the soil delineation boundaries were plotted and verified at closely spaced intervals. In the broadly defined units the soil delineation boundaries were plotted and verified at greater intervals. The intensity of mapping was based on the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use. On the soil map legend at the back of this survey, the broadly defined units are identified by an asterisk following the map unit name.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

map unit descriptions

101—Asta gravelly sandy loam, 5 to 15 percent slopes. This very deep, well drained soil is on glacial outwash terraces. It formed in volcanic ash deposited over glacial outwash. The native vegetation is mainly mixed conifers. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown gravelly sandy loam about 13 inches thick. The subsoil is brown and strong brown loam and strong brown silt loam

about 47 inches thick. The substratum to a depth of 71 inches or more is strong brown silt loam.

Included in this unit are small areas of Neer stony sandy loam, Ponto stony sandy loam, and a soil that is similar to this Asta soil but has slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Asta soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 7,310 cubic feet, or 34,200 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

This unit has few limitations for timber production. Plant competition delays natural regeneration of trees but does not prevent the eventual development of a fully stocked, normal stand. Among the trees suitable for planting are ponderosa pine, Douglas-fir, and white fir.

The understory includes common snowberry, brackenfern, and oak.

This map unit is in capability unit IIIe-1(21), nonirrigated.

102—Asta gravelly sandy loam, 15 to 50 percent slopes. This very deep, well drained soil is on glacial outwash terraces. It formed in volcanic ash deposited over glacial outwash. The native vegetation is mainly mixed conifers. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown gravelly sandy loam about 13 inches thick. The subsoil is brown and strong brown loam and strong brown silt loam about 47 inches thick. The substratum to a depth of 71 inches or more is strong brown silt loam.

Included in this unit are small areas of Neer stony sandy loam, Ponto stony sandy loam, and a soil that is similar to this Asta soil but has slopes of more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Asta soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 7,310 cubic feet, or 34,200 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazards of erosion and plant competition. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in the steeper areas. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine, Douglas-fir, and white fir.

The understory includes common snowberry, brackenfern, and oak.

This map unit is in capability subclass VIe(21), nonirrigated.

103—Asta cobbly sandy loam, 15 to 50 percent slopes. This very deep, well drained soil is on glacial outwash terraces. It formed in volcanic ash deposited over glacial outwash. The native vegetation is mainly mixed conifers. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown cobbly sandy loam about 13 inches thick. The upper 21 inches of the subsoil is brown and strong brown cobbly loam. The lower 26 inches is strong brown cobbly silt loam. The substratum to a depth of 71 inches or more is strong brown cobbly silt loam.

Included in this unit are small areas of Neer stony sandy loam, Ponto stony sandy loam, and a soil that is similar to this Asta soil but has slopes of more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Asta soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 7,310 cubic feet, or 34,200 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazards of erosion and plant competition. Conventional methods of harvesting trees can be used in the more gently sloping areas but are difficult to use in the steeper areas. Proper design of road drainage systems and care in the placement of culverts help to

control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine, Douglas-fir, and white fir.

The understory includes common snowberry, brackenfern, and oak.

This map unit is in capability subclass VIe(21), nonirrigated.

104—Atter very gravelly sandy loam, 0 to 5 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans. It formed in mixed alluvium. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,800 to 3,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown and pale brown very gravelly sandy loam about 18 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown very cobbly loamy sand and very cobbly sand.

Included in this unit are small areas of Stoner gravelly sandy loam and Riverwash in intermittent drainageways. Included areas make up about 10 percent of the total acreage.

Permeability of this Atter soil is very rapid. Available water capacity is low or very low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Jeffrey pine, and Douglas-fir. It can produce about 1,650 cubic feet, or 7,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes Idaho fescue, California brome, and antelope bitterbrush.

This unit is in capability unit IVs-4(21), nonirrigated.

105—Atter very cobbly sandy loam, 0 to 5 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans. It formed in mixed alluvium. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,800 to 3,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown and pale brown very cobbly sandy loam about 18 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown very cobbly loamy sand and very cobbly sand. A few cobbles are on the surface in most places.

Included in this unit are small areas of Stoner gravelly sandy loam and a soil that is similar to this Atter soil but has slopes of 5 to 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Atter soil is very rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Jeffrey pine, and Douglas-fir. It can produce about 1,650 cubic feet, or 7,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. The very low to low available water capacity generally influences seedling survival in areas where understory plants are numerous. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

If the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes Idaho fescue, California brome, and antelope bitterbrush.

This unit is in capability unit IVs-4(21), nonirrigated.

106—Atter very bouldery loamy fine sand, 5 to 30 percent slopes. This very deep, somewhat excessively drained soil is on alluvial fans. It formed in mixed alluvium. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, many boulders are on the surface. The surface layer is dark grayish brown and pale brown very bouldery loamy fine sand about 23 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and pale brown very bouldery loamy sand and very bouldery sand.

Included in this unit are small areas of Stoner gravelly sandy loam and a soil that is similar to this Atter soil but has slopes of 30 to 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Atter soil is very rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland and for livestock grazing.

This unit is poorly suited to woodland. It can produce about 1,650 cubic feet, or 7,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality, equipment limitations, and the hazard of erosion. The very low available water capacity generally influences seedling survival in areas where understory plants are numerous. Boulders on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Reforestation is limited to hand planting. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes Idaho fescue, California brome, and antelope bitterbrush.

This map unit is in capability subclass VIIs(21), nonirrigated.

107—Avis-Oosen complex, 5 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

This unit is 45 percent Avis very stony sandy loam and 25 percent Oosen loamy sand. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Oosen soil but is underlain by sand at a depth of 40 to 60 inches. Also included are small areas of Lava flows and Rock outcrop. Included areas make up about 30 percent of the total acreage.

The Avis soil is very deep and somewhat excessively drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 3 inches thick. The surface layer is yellowish brown very stony sandy loam about 13 inches thick. The underlying material to a depth of 72 inches or more is yellowish brown and light yellowish brown very gravelly loamy sand and very gravelly sand. Many stones are on the surface in most places.

Permeability of the Avis soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Oosen soil is very deep and somewhat excessively drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/4 inch thick. Typically, the surface layer is dark brown and light yellowish brown loamy sand about 12 inches thick. The upper 16 inches of the underlying material is yellowish brown loamy sand. The lower part to a depth of 72 inches or more is dark brown sand.

Permeability of the Oosen soil is rapid. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. The Avis soil can produce about 1,970 cubic feet, or 8,560 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old. The Oosen soil can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber on this unit are seedling mortality and plant competition. Stones on the surface of the Avis soil can interfere with felling, yarding, and other operations involving the use of equipment.

The low to very low available water capacity generally influences seedling survival in areas where understory plants are numerous. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are white fir, California red fir, and, on the Avis soil, ponderosa pine.

The understory includes manzanita, snowbrush ceanothus, and Sierra chinquapin.

This map unit is in capability subclass VIs(22), nonirrigated.

108—Avis-Oosen complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

This unit is 60 percent Avis very stony sandy loam and 25 percent Oosen loamy sand. The components of this

unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to this Oosen soil but is underlain by sand at a depth of 40 to 60 inches. Also included are small areas of Lava flows and Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Avis soil is very deep and somewhat excessively drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 3 inches thick. The surface layer is yellowish brown very stony sandy loam about 13 inches thick. The underlying material to a depth of 72 inches or more is yellowish brown and light yellowish brown very gravelly loamy sand and very gravelly sand. Many stones are on the surface in most places.

Permeability of the Avis soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

The Oosen soil is very deep and somewhat excessively drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/4 inch thick. The surface layer is dark brown and light yellowish brown loamy sand about 12 inches thick. The upper 16 inches of the underlying material is yellowish brown loamy sand. The lower part to a depth of 72 inches or more is dark brown sand.

Permeability of the Oosen soil is rapid. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. The Avis soil can produce about 1,970 cubic feet, or 8,560 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old. The Oosen soil can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber on this unit are slope, the hazard of erosion, seedling mortality, and plant competition. Stones on the surface of the Avis soil can interfere with felling, yarding, and other operations involving the use of equipment. Conventional methods of harvest are difficult to use because of the steepness of slope. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

The low to very low available water capacity generally influences seedling survival in areas where understory plants are numerous. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are white fir, California red fir, and, on the Avis soil, ponderosa pine.

The understory includes manzanita, snowbrush ceanothus, and Sierra chinquapin.

This map unit is in capability subclass VIIs(22), nonirrigated.

109—Avis-Lava flows complex, 5 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

This unit is 60 percent Avis very stony sandy loam and 30 percent Lava flows. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Oosen loamy sand and a soil that is similar to the Avis soil but has slopes of 30 to 50 percent. Included areas make up about 10 percent of the total acreage.

The Avis soil is very deep and somewhat excessively drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 3 inches thick. The surface layer is yellowish brown very stony sandy loam about 13 inches thick. The underlying material to a depth of 75 inches or more is yellowish brown and light yellowish brown very gravelly loamy sand and very gravelly sand. Many stones are on the surface in most places.

Permeability of the Avis soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Lava flows consists of areas covered by jagged lava surfaces and angular blocks with crevices. Soil material is in a few cracks and sheltered pockets.

This unit is used as woodland.

This unit is poorly suited to the production of ponderosa pine, white fir, and Douglas-fir. The Avis soil can produce about 1,970 cubic feet, or 8,560 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are equipment limitations, seedling mortality, and plant competition. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. The very low to low available water capacity generally influences seedling survival in areas where understory plants are numerous. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are

suitable for planting are white fir, California red fir, and ponderosa pine.

The understory includes bearberry manzanita, snowbrush ceanothus, and Sierra chinquapin.

This map unit is in capability subclass VIIs(22), nonirrigated.

110—Bogus stony loam, 15 to 50 percent slopes. This very deep, well drained soil is on mountains. It formed in residuum derived dominantly from tuff. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,500 to 5,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown stony loam 3 inches thick. The next layer is dark grayish brown and grayish brown clay loam about 17 inches thick. The subsoil is yellowish brown clay loam, clay, and sandy clay about 42 inches thick. Weathered tuff is at a depth of 62 inches or more. A few stones are on the surface in most places.

Included in this unit are small areas of Kuck clay loam, 9 to 15 percent slopes; Rock outcrop; and a soil that is similar to this Bogus soil but is underlain by tuff at a depth of 20 to 60 inches. Included areas make up about 25 percent of the total acreage.

Permeability of this Bogus soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of Jeffrey pine, ponderosa pine, and Douglas-fir. It can produce about 5,540 cubic feet, or 26,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Jeffrey pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Conventional methods of harvesting trees can be used. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are Douglas-fir and Jeffrey pine.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes needlegrass, fescue, lupine, and roundleaf snowberry. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIe(22), nonirrigated.

111—Bogus very stony loam, 15 to 50 percent slopes. This very deep, well drained soil is on mountains. It formed in residuum derived dominantly from tuff. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,500 to 5,500 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown very stony loam 3 inches thick. The next layer is dark grayish brown and grayish brown clay loam about 17 inches thick. The subsoil is yellowish brown clay loam, clay, and sandy clay about 42 inches thick. Many stones are on the surface in most places.

Included in this unit are small areas of Kuck clay loam, 9 to 15 percent slopes; a soil that is similar to this Bogus soil but is underlain by tuff at a depth of 20 to 60 inches; and Rock outcrop. Included areas make up about 25 percent of the total acreage.

Permeability of this Bogus soil is slow. Available water capacity is high. Effective rooting depth is 60 to 80 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of Jeffrey pine, ponderosa pine, and Douglas-fir. It can produce about 5,540 cubic feet, or 26,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Jeffrey pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, stones on the surface, equipment limitations, and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Because the surface layer is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Stones on the surface interfere with felling, yarding, and other operations involving the use of equipment. Reforestation is limited to hand planting. Among the trees that are suitable for planting are Douglas-fir and Jeffrey pine.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes needlegrass, fescue,

lupine, and snowberry. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIIs(22), nonirrigated.

112—Bonnet loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak trees. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown loam about 14 inches thick. The upper part of the underlying material is pale brown and grayish brown very gravelly loam and very gravelly sandy loam 32 inches thick. The lower part to a depth of 61 inches or more is pale brown extremely gravelly loamy sand. The underlying material is calcareous. In some areas the surface layer is gravelly loam or gravelly sandy loam.

Included in this unit are small areas of Dotta loam, Stoner gravelly sandy loam, Xerofluvents on flood plains, and Riverwash. Included areas make up about 10 percent of the total acreage.

Permeability of this Bonnet soil is moderately rapid to a depth of 46 inches and rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main irrigated crops are wheat, barley, and potatoes. Nonirrigated wheat and barley are also grown.

This unit is suited to the crops commonly grown in the area. It is limited mainly by droughtiness. Because precipitation is not sufficient for annual cropping, a cropping system that includes summer fallow is most suitable. Because the water intake rate of the soil is rapid, sprinkler irrigation is best suited. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because the soil is droughty, applications of irrigation water should be light and frequent. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. Fertilizer is needed for optimum growth of grasses and legumes. Using management that maintains optimum vigor and quality of forage plants is a good practice.

This unit is suited to use as rangeland. It has few limitations for this use. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, and buckbrush.

This unit is suited to homesite development. The main limitation for septic tank absorption fields is that the soil is a poor filter for effluent. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability unit IIIs-0(21), irrigated and nonirrigated.

113—Bonnet gravelly loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak trees. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown gravelly loam about 14 inches thick. The upper part of the underlying material is pale brown and grayish brown very gravelly loam and very gravelly sandy loam 34 inches thick. The lower part to a depth of 61 inches or more is pale brown extremely gravelly loamy sand. The underlying material is calcareous.

Included in this unit are small areas of Dotta loam, Stoner gravelly sandy loam, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Bonnet soil is moderately rapid to a depth of 46 inches and rapid below this depth. Available water capacity is very low or low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main irrigated crops are wheat, barley, and potatoes. Nonirrigated wheat and barley are also grown.

This unit is suited to the crops commonly grown in the area. It is limited mainly by droughtiness and the gravelly texture of the surface layer. Because precipitation is not sufficient for annual cropping, a cropping system that includes summer fallow is most suitable. Gravel in the surface layer causes rapid wear of equipment used for tillage.

Because the water intake rate is rapid, sprinkler irrigation is best suited to the soil in this unit. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because the soil is droughty, applications of irrigation water should be light and frequent.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. Fertilizer is needed for optimum growth of grasses and legumes. Using management that maintains optimum vigor and quality of forage plants is a good practice.

This unit is suited to use as rangeland. It has few limitations for this use. The soil responds well to fertilizer, to range seeding, and to proper grazing use. The potential plant community on this unit includes Idaho fescue, beardless wheatgrass, bottlebrush squirreltail, and western juniper.

This unit is suited to homesite development. The main limitations are the gravelly texture of the surface layer and the extremely gravelly substratum, which is a poor filter for effluent from septic tank absorption fields. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapid permeability in the lower part of the substratum.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability unit IIIs-4(21), irrigated and nonirrigated.

114—Bonnet gravelly loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak trees. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown gravelly loam about 14 inches thick. The upper part of the underlying material is pale brown and grayish brown very gravelly loam and very gravelly sandy loam 34 inches thick. The lower part to a depth of 61 inches or more is pale brown extremely gravelly loamy sand. The underlying material is calcareous. In some areas the surface layer is loam.

Included in this unit are small areas of Dotta loam, Stoner gravelly sandy loam, and Riverwash. Included areas make up about 20 percent of the total acreage.

Permeability of this Bonnet soil is moderately rapid to a depth of 46 inches and rapid below this depth. Available water capacity is very low or low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main irrigated crops are wheat, barley, and potatoes. Nonirrigated wheat and barley are also grown.

This unit is suited to crops commonly grown in the area. It is limited mainly by droughtiness and gravelly texture. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Gravel in the surface layer causes rapid wear of equipment used for tillage.

Because the water intake rate is rapid, sprinkler irrigation is best suited to the soil in this unit. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. Fertilizer is needed for optimum growth of grasses and legumes. Using management that maintains optimum vigor and quality of forage plants is a good practice.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. The potential plant community on the unit includes Idaho fescue, bluebunch wheatgrass, antelope bitterbrush, and western juniper.

This unit is suited to homesite development. The main limitations are the gravelly surface layer and the rapid permeability and high content of gravel in the lower part of the substratum. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapid permeability in the lower part of the substratum.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability unit IIIe-4(21), irrigated and nonirrigated.

115—Boomer loam, cool, 5 to 30 percent slopes. This deep, well drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly mixed conifers, oaks, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown loam about 10

inches thick. The upper 30 inches of the subsoil is yellowish red clay loam. The lower 13 inches is yellowish red sandy clay loam. Weathered rock is at a depth of 53 inches.

Included in this unit are small areas of Kimbel very gravelly loam, Neuns gravelly loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Boomer soil is moderately rapid. Available water capacity is moderate to high. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and incense-cedar. It can produce about 4,110 cubic feet, or 18,500 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are plant competition and the hazard of erosion. Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes mountain brome, manzanita, buckbrush, bluegrass, and blue wildrye. Livestock grazing should be managed to protect the unit from excessive erosion.

This map unit is in capability unit IVe-1(5), nonirrigated.

116—Boomer, cool-Neuns complex, 30 to 70 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, oaks, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Boomer loam, cool, and 30 percent Neuns gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Kinkel very gravelly loam that has slopes of as much as 70 percent, Rock outcrop, and Riverwash, which is in intermittent drainageways. Included areas make up about 30 percent of the total acreage.

The Boomer soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown loam about 10 inches thick. The upper 30 inches of the subsoil is yellowish red clay loam. The lower 13 inches is yellowish red sandy clay loam. Weathered rock is at a depth of 53 inches.

Permeability of the Boomer soil is moderately slow. Available water capacity is moderate to high. Effective rooting depth is 40 to 60 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

The Neuns soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and light yellowish brown gravelly loam about 8 inches thick. The subsoil is yellowish brown and pale brown very gravelly loam about 27 inches thick. Fractured bedrock is at a depth of 35 inches.

Permeability of the Neuns soil is moderate. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine and Douglas-fir. The Boomer soil can produce about 4,110 cubic feet, or 18,500 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old. The Neuns soil can produce about 8,425 cubic feet, or 27,750 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, slope, equipment limitations, and plant competition. The very low to low available water capacity of the Neuns soil generally influences seedling survival. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

Conventional methods of harvest are difficult to use because of the steepness of slope. The high-lead logging method is more efficient than most other methods and is less damaging to the soil surface.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes manzanita, squawcarpet, bluegrass, and blue wildrye. Livestock grazing should be managed to protect the unit from excessive erosion.

This map unit is in capability subclass VIIe(5), nonirrigated.

117—Boomer Variant sandy loam, 30 to 50 percent slopes. This very deep, well drained soil is on mountains. It formed in residuum derived dominantly from sandstone. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown and light brown sandy loam about 10 inches thick. The upper 15 inches of the subsoil is light yellowish brown sandy loam. The lower 45 inches is yellowish brown sandy clay loam, loam, and sandy loam. Weathered bedrock is at a depth of 70 inches.

Included in this unit are small areas of Neuns gravelly loam and soils that are similar to this Boomer Variant soil but have less than 18 percent clay in the subsoil, are underlain by hard sandstone at a depth of 20 to 40 inches, or have slopes of as little as 15 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Boomer Variant soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 60 to 80 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and sugar pine. It can produce about 4,396 cubic feet, or 20,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Conventional methods of harvesting trees can be used.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes vetch, Thurber needlegrass, and oak. Livestock grazing should be managed to protect the unit from excessive erosion.

This map unit is in capability subclass VIe(5), nonirrigated.

118—Boomer Variant stony sandy loam, 5 to 30 percent slopes. This very deep, well drained soil is on mountains. It formed in residuum derived dominantly from sandstone. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown and light brown stony sandy loam about 10 inches thick. The upper 15 inches of the subsoil is light yellowish brown stony sandy loam. The lower 45 inches is yellowish brown stony sandy clay loam, stony loam, and stony sandy loam. Weathered bedrock is at a depth of 70 inches. A few stones are on the surface in most places.

Included in this unit are small areas of Neuns gravelly loam and soils that are similar to this Boomer Variant soil but are 20 to 40 inches deep to hard sandstone or have slopes of as much as 50 percent. Also included are small areas of Rubble land and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Boomer Variant soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 to 80 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and sugar pine. It can produce about 4,396 cubic feet, or 20,000 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir. Competing vegetation can be controlled by proper site preparation.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory vegetation. The understory vegetation includes ceanothus, vetch, and needlegrass.

This map unit is in capability subclass VIe(5), nonirrigated.

119—Chaix-Chawanakee gravelly coarse sandy loams, 5 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average

annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 50 percent Chaix gravelly coarse sandy loam and 25 percent Chawanakee gravelly coarse sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Chaix soil but is loamy sand or sand throughout or is more than 40 inches deep to weathered rock. Also included is a soil that is similar to the Chawanakee soil but is underlain by hard bedrock at a depth of 10 to 20 inches. Included areas make up about 25 percent of the total acreage.

The Chaix soil is moderately deep and well drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The subsoil is very pale brown coarse sandy loam about 24 inches thick. The substratum is light yellowish brown gravelly coarse sandy loam about 6 inches thick. Weathered rock is at a depth of 34 inches.

Permeability of the Chaix soil is moderately rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Chawanakee soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is light brownish gray gravelly coarse sandy loam about 4 inches thick. The subsoil is pale brown gravelly coarse sandy loam about 12 inches thick. Weathered rock is at a depth of 16 inches.

Permeability of the Chawanakee soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland and for livestock grazing.

The Chaix soil is suited to the production of ponderosa pine, Douglas-fir, white fir, and sugar pine. It can produce about 3,693 cubic feet, or 16,610 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The Chawanakee soil is poorly suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,859 cubic feet, or 12,830 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old. Management that minimizes the risk of erosion is essential in harvesting timber.

The main concerns in producing and harvesting timber are the hazard of erosion, seedling mortality, and plant competition. Windthrow is a hazard on the Chawanakee soil because of shallow soil depth. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

The low available water capacity of the Chaix soil generally influences seedling survival in areas where understory plants are numerous. Proper site preparation controls initial plant competition.

Reforestation is limited by shallow soil depth and droughtiness. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory vegetation includes manzanita and buckbrush.

This map unit is in capability unit IVe-4(5), nonirrigated.

120—Chaix-Chawanakee gravelly coarse sandy loams, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 50 percent Chaix gravelly coarse sandy loam and 25 percent Chawanakee gravelly coarse sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to the Chaix soil but are loamy sand or sand throughout or are more than 40 inches deep to weathered rock. Also included are small areas of Rock outcrop. Included areas make up about 25 percent of the total acreage.

The Chaix soil is moderately deep and well drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The subsoil is very pale brown gravelly coarse sandy loam about 24 inches thick. The substratum is light yellowish brown gravelly coarse sandy loam about 6 inches thick. Weathered rock is at a depth of 34 inches.

Permeability of the Chaix soil is moderately rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Chawanakee soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially

decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is light brownish gray gravelly coarse sandy loam about 4 inches thick. The subsoil is pale brown gravelly coarse sandy loam about 12 inches thick. Weathered rock is at a depth of 16 inches.

Permeability of the Chawanakee soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland.

The Chaix soil is suited to the production of ponderosa pine, Douglas-fir, white fir, and sugar pine. It can produce about 3,693 feet, or 16,610 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The Chawanakee soil is poorly suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,869 cubic feet, or 12,830 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old. Management that minimizes the risk of erosion is essential in harvesting timber.

The main concerns in producing and harvesting timber are the hazard of erosion, seedling mortality, and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Conventional methods of harvesting trees generally can be used but are difficult to apply in the steeper areas.

The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Proper site preparation controls initial plant competition, and spraying controls subsequent growth.

Reforestation is limited by shallow soil depth and droughtiness. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory includes manzanita and buckbrush.

This map unit is in capability subclass VIe(5), nonirrigated.

121—Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 50 percent Chaix gravelly coarse sandy loam and 25 percent Chawanakee gravelly coarse sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Chaix soil but is loamy sand or sand throughout, a soil that is similar to the Chawanakee soil but is underlain by hard bedrock, and Rock outcrop. Included areas make up about 25 percent of the total acreage.

The Chaix soil is moderately deep and well drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown gravelly coarse sandy loam about 4 inches thick. The subsoil is very pale brown gravelly coarse sandy loam about 24 inches thick. The substratum is light yellowish brown gravelly coarse sandy loam about 6 inches thick. Weathered rock is at a depth of 34 inches.

Permeability of the Chaix soil is moderately rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very high.

The Chawanakee soil is shallow and somewhat excessively drained. It formed in residuum derived dominantly from granitic rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is light brownish gray gravelly coarse sandy loam about 4 inches thick. The subsoil is pale brown gravelly coarse sandy loam about 12 inches thick. Weathered rock is at a depth of 16 inches.

Permeability of the Chawanakee soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used as woodland.

The Chaix soil is suited to the production of ponderosa pine, Douglas-fir, white fir, and sugar pine. It can produce about 3,693 cubic feet, or 16,610 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The Chawanakee soil is poorly suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,859 cubic feet, or 12,830 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber on both soils are the hazard of erosion, equipment limitations, seedling mortality, and plant competition. Management that minimizes the risk of erosion is essential in harvesting timber. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Steepness of slope limits the the kinds of equipment that can be used in forest management.

Reforestation is limited by shallow soil depth and droughtiness. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Proper site preparation controls

initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting on this unit are ponderosa pine and Douglas-fir.

The understory includes manzanita and buckbrush.

This map unit is in capability subclass VIIe(5), nonirrigated.

122—Copsey clay, 0 to 9 percent slopes. This very deep, poorly drained soil is on alluvial fans. It formed in alluvium derived dominantly from serpentine. The vegetation in areas not cultivated is mainly perennial grasses and forbs. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark brown and black clay about 18 inches thick. The underlying material to a depth of 60 inches or more is very dark gray, dark gray, and dark grayish brown gravelly clay.

Included in this unit are small areas of a Dubakella stony loam that has slopes of less than 5 percent, a soil that is similar to this Copsey soil but formed in alluvium that is low in content of serpentine minerals, a soil that is similar to this Copsey soil but has slopes of as much as 30 percent, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Copsey soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. A seasonal high water table is at a depth of 6 to 18 inches from December through March. The rest of the year it fluctuates between depths of 18 and 40 inches.

This unit is used for hay and pasture and as rangeland.

This unit is suited to irrigated hay and pasture. The main limitations are the high water table, very slow permeability, compaction, and fertility. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

Because of the very slow permeability of the soil, sprinkler irrigation is best suited to this unit. Irrigation water must be applied carefully to prevent the development of a perched water table.

Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the high water table, shrink-swell potential, and low fertility.

Range seeding is a suitable practice if the range is in poor condition. Plants that tolerate wetness and high shrink-swell potential should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Fertilizer is needed for optimum growth of grasses and legumes.

The potential plant community on this unit includes carex, rush, redtop, and bluegrass.

This map unit is in capability unit IIIw-5(21), irrigated and nonirrigated.

123—Copsey gravelly clay, 2 to 9 percent slopes. This very deep, poorly drained soil is on alluvial fans. It formed in alluvium derived dominantly from serpentine. The vegetation in areas not cultivated is mainly perennial grasses and forbs. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark brown gravelly clay about 18 inches thick. The underlying material to a depth of 60 inches or more is very dark gray, dark gray, and dark grayish brown gravelly clay.

Included in this unit are small areas of Dubakella stony loam, a moderately well drained soil that is similar to this Copsey soil but formed in alluvium that is low in serpentine materials and contains less gravel, soils that are similar to this Copsey soil but have slopes of 9 to 30 percent, and Rock outcrop. Included areas make up about 25 percent of the total acreage.

Permeability of this Copsey soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. A seasonal high water table is at a depth of 6 to 18 inches from December through March.

This unit is used for hay and pasture and as rangeland.

This unit is suited to irrigated hay and pasture. The main limitations are the seasonal high water table, very slow permeability, gravel in the surface layer, and low fertility. Gravel in the surface layer causes rapid wear of equipment used for tillage. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

Because of very slow permeability, sprinkler irrigation is best suited to this soil. Irrigation water must be applied carefully to prevent the development of a perched water table.

Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the high water table, shrink-swell potential, and low fertility. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Range seeding is a suitable practice if the range is in poor condition. Plants that tolerate wetness and high

shrink-swell potential should be seeded. Fertilizer is needed for optimum growth of grasses and legumes.

The potential plant community on this unit includes carex, rush, redtop, and bluegrass.

This map unit is in capability unit IIIw-5(21), irrigated and nonirrigated.

124—Copsey cobbly clay, 2 to 9 percent slopes. This very deep, poorly drained soil is on alluvial fans. It formed in alluvium derived dominantly from serpentine. The vegetation in areas not cultivated is mainly perennial grasses and forbs. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark brown cobbly clay about 18 inches thick. The underlying material to a depth of 60 inches or more is very dark gray, dark gray, and dark grayish brown cobbly clay. A few cobbles are on the surface in most places.

Included in this unit are small areas of Dubakella stony loam, moderately well drained soils that are similar to this Copsey soil but formed in alluvium that is low in content of serpentine minerals or have slopes of as much as 30 percent, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Copsey soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate. A seasonal high water table is at a depth of 6 to 18 inches from December through March.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the seasonal high water table, shrink-swell potential, and low fertility. Fertilizer is needed for optimum growth of grasses and legumes. Use of mechanical treatment practices is not practical, because the surface is cobbly. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Plants that tolerate wetness and high shrink-swell potential should be seeded.

The potential plant community on this unit includes carex, rush, redtop, and bluegrass.

This map unit is in capability unit IVw-7(21), nonirrigated.

125—Deetz gravelly loamy sand, 0 to 5 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/2 inch thick. The surface layer is very dark grayish brown, dark brown, and brown gravelly loamy sand about 7 inches thick. The upper 31 inches of the underlying material is pale brown, light yellowish brown, and very pale brown gravelly loamy sand. The lower part to a depth of 65 inches or more is pale brown, gray, and light gray very gravelly sand.

Included in this unit are small areas of a soil that is similar to this Deetz soil but is very gravelly throughout, Rock outcrop, Riverwash, and Xerofluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Deetz soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as woodland and for homesite development.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. It can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. The very low to low available water capacity of the soil in this unit generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory includes manzanita, squawcarpet, and bitterbrush.

This unit is suited to homesite development. The main limitations are seepage and droughtiness. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small seeded plants.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

This map unit is in capability unit IVs-4(21), nonirrigated.

126—Deetz gravelly loamy sand, 5 to 15 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive

igneous rock and volcanic ash. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/2 inch thick. The surface layer is very dark grayish brown, dark brown, and brown gravelly loamy sand about 7 inches thick. The upper 31 inches of the underlying material is pale brown, light yellowish brown, and very pale brown gravelly loamy sand. The lower part to a depth of 65 inches or more is pale brown, gray, and light gray very gravelly sand.

Included in this unit are small areas of soils that are similar to this Deetz soil but are very gravelly throughout or have slopes of as much as 30 percent. Also included are a few small areas of Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Deetz soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for homesite development.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. It can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. Reforestation must be carefully managed to reduce competition from undesirable understory plants. The very low or low available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory includes manzanita, squawcarpet, and bitterbrush.

This unit is suited to homesite development. The main limitations are seepage and droughtiness. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable subsoil serving as a poor filter for effluent.

This map unit is in capability unit IVs-4(21), nonirrigated.

127—Deetz stony loamy sand, 2 to 15 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/2 inch thick. The surface layer is very dark grayish brown, dark brown, and brown stony loamy sand about 7 inches thick. The upper 31 inches of the underlying material is pale brown, light yellowish brown, and very pale brown cobbly loamy sand. The lower part to a depth of 65 inches or more is pale brown, gray, and light gray very cobbly sand. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Deetz soil but has slopes of 15 to 30 percent. Also included are small areas of Rubble land. Included areas make up about 15 percent of the total acreage.

Permeability of this Deetz soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for homesite development.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. It can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. Reforestation must be carefully managed to reduce competition from undesirable understory plants. The very low available water capacity of the soil in this unit generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory includes manzanita, squawcarpet, and bitterbrush.

This unit is suited to homesite development. The main limitations are seepage, droughtiness, and stones. Removal of stones and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small seeded plants.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

This map unit is in capability subclass VIs(21), nonirrigated.

128—Deetz stony loamy sand, 15 to 30 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown, dark brown, and brown stony loamy sand about 7 inches thick. The upper 31 inches of the underlying material is pale brown, light yellowish brown, and very pale brown cobbly loamy sand. The lower part to a depth of 65 inches or more is pale brown, gray, and light gray very cobbly sand. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Deetz soil but is very gravelly throughout. Also included are small areas of Rubble land. Included areas make up about 15 percent of the total acreage.

Permeability of this Deetz soil is rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for homesite development.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. It can produce about 6,250 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. Reforestation must be carefully managed to reduce competition from undesirable understory plants. The very low available water capacity of the soil in this unit generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are Douglas-fir and ponderosa pine.

The understory includes manzanita, squawcarpet, and bitterbrush.

This unit is suited to homesite development. The main limitations are seepage, stones, and slope. Removal of stones and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small seeded plants.

The steepness of slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

This map unit is in capability subclass VIs(21), nonirrigated.

129—Delaney sand, 0 to 9 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown sand about 9 inches thick. The underlying material to a depth of 68 inches or more is grayish brown, pale brown, light gray, very pale brown, and white sand.

Included in this unit are small areas of Plutos loamy sand, Rubble land, and Xerofluvents. Included areas make up about 20 percent of the total acreage.

Permeability of this Delaney soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated hay and pasture. The main limitations are droughtiness and low fertility. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by droughtiness, low fertility, and the hazard of erosion. If the range vegetation is seriously deteriorated, seeding is needed. Plants that tolerate droughtiness and low fertility should be seeded. The soil in this unit is limited for livestock watering ponds and other water impoundments because of the seepage potential. Proper grazing use will reduce the risk of soil blowing.

The potential plant community on this unit includes western juniper, manzanita, and antelope bitterbrush.

This unit is suited to homesite development. The main limitations are seepage, the hazard of soil blowing, droughtiness, and low fertility. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit IIIs-4(21), irrigated, and capability subclass VIe(21), nonirrigated.

130—Delaney gravelly sand, 0 to 9 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown gravelly sand about 9 inches thick. The underlying material to a depth of 68 inches or more is grayish brown, pale brown, light gray, very pale brown, and white gravelly sand.

Included in this unit are small areas of Plutos loamy sand, Rubble land, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Delaney soil is rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated hay and pasture. The main limitations are droughtiness, low fertility, and the gravelly surface layer. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Gravel in the surface layer causes rapid wear of equipment used for tillage.

Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by droughtiness, low fertility, and the hazard of erosion. If the range vegetation is seriously deteriorated, seeding is needed. Plants that tolerate droughtiness and low fertility should be seeded. Livestock grazing should be managed to protect the soil from excessive soil blowing. The soil in this unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

The potential plant community on this unit is mainly western juniper, manzanita, and antelope bitterbrush.

This unit is suited to homesite development. The main limitations are the hazard of soil blowing, seepage, gravel in the soil, droughtiness, and low fertility. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Removal of pebbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit IVs-4(21), irrigated, and capability subclass VIe(21), nonirrigated.

131—Delaney stony sand, 0 to 15 percent slopes. This deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown stony sand about 9 inches thick. The underlying material is grayish brown, pale brown, light gray, very pale brown, and white stony sand about 36 inches thick. Hard bedrock is at a depth of 45 inches. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Delaney soil but has a sand surface layer, Plutos loamy sand, Riverwash, and Lava flows. Also included are small areas of soils that have slopes of more than 15 percent and are moderately or severely eroded. Included areas make up about 20 percent of the total acreage.

Permeability of this Delaney soil is rapid. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland and for homesite development.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited mainly by droughtiness, low fertility, the hazard of soil blowing, and stones on the surface. If the range is overgrazed, the proportion of preferred forage plants decreases and the proportion of less preferred forage plants increases. Therefore, livestock grazing should be managed so that the desired balance of species is maintained in the plant community.

Proper grazing use helps to control soil blowing. If reseeding is necessary, only plants that can tolerate drought or low fertility should be used. Use of

mechanical treatment practices is not practical, because the surface is stony. The soil in this unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

The potential plant community on this unit includes western juniper, manzanita, and big sagebrush.

This unit is poorly suited to homesite development. The main limitations are seepage, limited depth to rock, droughtiness, low fertility, the hazard of soil blowing, and stones. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil and bedrock serving as poor filters for effluent. The deep cuts needed to provide essentially level building sites can expose bedrock.

Removal of stones and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability subclass VIe(21), nonirrigated.

132—Delaney sandy loam, 0 to 2 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown sandy loam about 9 inches thick. The underlying material to a depth of 68 inches or more is grayish brown, pale brown, light gray, very pale brown, and white sand.

Included in this unit are small areas of Plutos loamy sand, Riverwash, and Xerofluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Delaney soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated hay and pasture. The main limitations are droughtiness and low fertility. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by droughtiness, low fertility, and the hazard of soil blowing. If the range vegetation is seriously deteriorated, seeding is needed. Only plants that tolerate droughtiness and low fertility should be seeded. Livestock grazing should be managed to protect the soil from excessive soil blowing. The soil in this unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, rubber rabbitbrush, and redstem filaree.

This unit is suited to homesite development. The main limitations are seepage, the hazard of erosion, droughtiness, and low fertility. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIIs-4(21), irrigated, and IIIe-4(21), nonirrigated.

133—Delaney sandy loam, 2 to 5 percent slopes. This very deep, somewhat excessively drained soil is on glacial outwash fans. It formed in glaciofluvial deposits derived dominantly from mixed extrusive igneous rock and volcanic ash. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown sandy loam about 9 inches thick. The underlying material to a depth of 68 inches or more is pale brown, light gray, very pale brown, and white sand.

Included in this unit are small areas of Plutos loamy sand, Riverwash, and Xerofluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Delaney soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated hay and pasture. The main limitations are droughtiness and low fertility. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be

adjusted to the available water capacity, the water intake rate, and the crop needs.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by droughtiness, low fertility, and the hazard of soil blowing.

If the range vegetation is seriously deteriorated, seeding is needed. Plants that tolerate droughtiness and low fertility should be seeded. Livestock grazing should be managed to protect the soil from excessive soil blowing. The soil in this unit is limited for livestock watering ponds and other water impoundments because of the seepage potential.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, rubber rabbitbrush, and redstem filaree.

This unit is suited to homesite development. The main limitations are seepage, the hazard of soil blowing, droughtiness, and low fertility. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of the rapidly permeable soil serving as a poor filter for effluent.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit IIIe-4(21), irrigated and nonirrigated.

134—Delaney Variant silt, 0 to 2 percent slopes. This very deep, well drained soil is on glacial outwash plains. It formed in glaciofluvial deposits derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray silt about 7 inches thick. The underlying material to a depth of 60 inches or more is stratified and is gray, light gray, and grayish brown silt, loamy fine sand, loamy sand, sandy loam, and coarse sand.

Included in this unit are small areas of Delaney sandy loam, Plutos loamy sand, a soil that is similar to this Delaney Variant soil but is underlain at a depth of 20 to 40 inches by a strongly cemented pumice layer, and Xerofluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Delaney Variant soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to frequent but brief periods of flooding in July, August, and September.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated hay and pasture. The main limitations are low fertility and flooding in summer.

Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. The risk of flooding can be reduced by the use of dikes and diversions.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by low fertility and flooding in summer. The soil responds well to fertilizer, to range seeding, and to proper grazing use. Areas that are heavily infested with undesirable plants can be improved by chemical or mechanical treatment. Plants that tolerate damaging deposition should be seeded. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, and beardless wheatgrass.

This unit is poorly suited to homesite development. The main limitations are the hazard of flooding and low fertility. Flooding can be controlled only by use of major flood control structures. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIw-2(21), irrigated, and IIIw-2(21), nonirrigated.

135—Deven-Rubble land complex, 0 to 30 percent slopes. This map unit is on plateaus. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 3,500 to 4,000 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Deven loam and 35 percent Rubble land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Kuck clay loam, Pinehurst Variant, a soil that is similar to this Deven loam but is 20 to 40 inches deep to bedrock, and Rock outcrop. Included areas make up about 25 percent of the total acreage.

The Deven soil is shallow and well drained. It formed in residuum derived dominantly from andesitic rock. Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is dark brown clay loam and

clay about 12 inches thick. Bedrock is at a depth of 17 inches.

Permeability of this Deven soil is slow. Available water capacity is very low to low. Effective rooting depth is 10 to 20 inches. Runoff is slow to rapid, and the hazard of water erosion is slight to high.

Rubble land consists of areas of stones and boulders. These areas do not support vegetation.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by stones and boulders on the surface and droughtiness. Cattle cannot graze areas uniformly because of the stones and boulders. Use of mechanical treatment practices is not practical because of the stones and boulders. Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing.

The potential plant community on this unit includes bluebunch wheatgrass, Nevada bluegrass, Thurber needlegrass, and western juniper.

This map unit is in capability subclass VIIs(21), nonirrigated.

136—Diyou loam. This very deep, somewhat poorly drained soil is on flood plains. It formed in alluvium derived from mixed rock sources. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 11 inches thick. The underlying material to a depth of 60 inches or more is stratified grayish brown, gray, and light olive gray sandy loam, sandy clay loam, and clay loam. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Esro silt loam, Settlemeyer Variant silt loam, Stoner gravelly sandy loam, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Diyou soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 24 to 36 inches from February through June. This soil is subject to flooding during prolonged, high-intensity storms. Damaging floods occur about 3 years out of 10. Channeling and deposition are common along streambanks.

This unit is used for cultivated crops, hay and pasture, and rangeland.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the seasonal high water table. Drainage can be provided by using tile systems to intercept water from higher lying areas.

Irrigation water must be applied carefully to prevent the development of a perched water table. Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. The main limitation is the seasonal high water table. Wetness limits the choice of plants and the period of cutting or grazing. Grasses and legumes that require good drainage can be grown if a deep tile drainage system is installed. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes carex, rush, tufted hairgrass, and bluegrass.

This unit is poorly suited to homesite development because of the hazard of flooding and the seasonal high water table.

This map unit is in capability unit IIIw-2(21), irrigated and nonirrigated.

137—Diyou loam, drained. This very deep, somewhat poorly drained soil is on flood plains. It formed in alluvium derived from mixed rock sources. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 11 inches thick. The underlying material to a depth of 60 inches or more is stratified grayish brown, gray, and light olive gray sandy loam, sandy clay loam, and clay loam. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Esro silt loam, Settlemeyer Variant silt loam, Stoner gravelly sandy loam, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Diyou soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of

water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches from February through June. This soil is subject to rare periods of flooding.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main crops are irrigated and nonirrigated wheat and barley.

This unit is suited to irrigated and nonirrigated crops commonly grown in the area. It is limited mainly by the seasonal high water table. Drainage can be provided by using tile systems to intercept water from higher lying areas.

Irrigation water must be applied carefully to prevent raising the water table. Sprinkler irrigation is the most suitable method of applying water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. The main limitation is the seasonal high water table. Grasses and legumes that require good drainage can be grown if a deep random tile system is installed. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes carex, rush, and tufted hairgrass.

This unit is poorly suited to homesite development. The main limitations are the high water table and the hazard of flooding. Septic tank absorption fields do not function properly during rainy periods because of wetness. Diversions that have outlets to bypass floodwater can be used to protect buildings and onsite sewage disposal systems from flooding. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is in capability units IIw-2(21), irrigated, and IIIw-2(21), nonirrigated.

138—Diyou loam, peat substratum. This very deep, somewhat poorly drained soil is on flood plains. It formed in alluvium derived from mixed rock sources. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 11 inches thick. The upper 29 inches of the underlying material is stratified, grayish brown, gray, and light olive gray sandy loam, sandy clay loam, and clay loam. The lower part to a depth of 62 inches is peat. In some areas the surface layer is sandy loam.

Included in this unit are small areas of a soil that is similar to this Diyou soil but has peat at a depth of 20 to 40 inches or has slopes of as much as 9 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Diyou soil is moderately slow to a depth of 40 inches and rapid below this depth. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 24 to 36 inches from February through June. This soil is subject to rare periods of flooding.

This unit is used for nonirrigated hay and pasture, rangeland, and urban development.

This unit is suited to nonirrigated hay and pasture. The main limitation is the seasonal high water table. Wetness limits the choice of plants and the period of cutting or grazing. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes carex, rush, tufted hairgrass, and bluegrass.

This unit is poorly suited to urban development. The main limitations are the seasonal high water table, the hazard of flooding, and limited load supporting capacity.

This map unit is in capability unit IIIw-2(21), nonirrigated.

139—Dotta loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 15 inches thick. The subsoil is dark grayish brown clay loam and dark brown sandy clay loam about 37 inches thick. The substratum to a depth of 62 inches or more is brown sandy clay loam.

Included in this unit are small areas of a soil that is similar to this Dotta soil but is mildly alkaline throughout

and is calcareous in a few places, Stoner gravelly sandy loam, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Dotta soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for irrigated and nonirrigated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to crops commonly grown in the area. It has few limitations.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. It has few limitations. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants. Septic tank absorption fields may not function properly because of the moderately slow permeability of the subsoil. Shrinking and swelling with alternate drying and wetting may be a problem in constructing buildings and roads.

This map unit is in capability subclasses IIc(21), irrigated, and IIIc(21), nonirrigated.

140—Dotta loam, 2 to 9 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 15 inches thick. The subsoil is dark grayish brown clay loam and dark brown sandy clay loam about 37 inches thick. The substratum to a depth of 62 inches or more is brown sandy clay loam.

Included in this unit are small areas of a soil that is similar to this Dotta soil but is mildly alkaline throughout and is calcareous in a few places. Included areas make up about 15 percent of the total acreage.

Permeability of this Dotta soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main crops are irrigated and nonirrigated wheat and barley.

This unit is suited to crops commonly grown in the area. It is limited mainly by slope and the hazard of erosion.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. If furrow or corrugation irrigation systems are used, runs should be on the contour or across the slope. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Waterways should be shaped and seeded to perennial grass. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to irrigated hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. It has few limitations. Onsite sewage disposal systems may not function properly because of the moderately slowly permeable subsoil. Shrinking and swelling with alternate drying and wetting of the soil may be a problem in constructing buildings and roads. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIe-1(21), irrigated, and IIIe-1(21), nonirrigated.

141—Dotta gravelly loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown gravelly loam about 15 inches thick. The subsoil is dark grayish brown gravelly clay loam and dark brown gravelly sandy clay loam about 37 inches thick. The substratum to a depth of 62 inches or more is brown gravelly sandy clay loam.

Included in this unit are small areas of a soil that is similar to this Dotta soil but is mildly alkaline throughout and is calcareous in a few places. Included areas make up about 15 percent of the total acreage.

Permeability of this Dotta soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main crops are irrigated and nonirrigated wheat and barley.

This unit is suited to crops commonly grown in the area. It is limited mainly by the low to moderate available water capacity and the gravelly surface layer.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Leveling is needed in sloping areas for the efficient application and removal of irrigation water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Gravel in the surface layer causes rapid wear of equipment used for tillage.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, western juniper, and buckbrush.

This map unit is suited to homesite development. It has few limitations. Onsite sewage disposal systems may not function properly because of the moderately slowly permeable subsoil. Shrinking and swelling with alternate drying and wetting may be a problem in constructing buildings and roads.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIs-4(21), irrigated, and IIIs-4(21), nonirrigated.

142—Dotta gravelly loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown gravelly loam about 15 inches thick. The subsoil is dark grayish brown gravelly clay loam and dark brown gravelly sandy clay loam about 37 inches thick. The substratum to a depth of 62 inches or more is brown gravelly sandy clay loam.

Included in this unit are small areas of a soil that is similar to this Dotta soil but is mildly alkaline throughout and is calcareous in a few places. Included areas make up about 15 percent of the total acreage.

Permeability of this Dotta soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main crops are irrigated and nonirrigated wheat and barley.

This unit is suited to crops commonly grown in the area. It is limited mainly by slope, the gravelly texture of the surface layer, and the hazard of erosion.

Furrow, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. If furrow irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Gravel in the surface layer causes rapid wear of equipment used for tillage.

This unit is suited to hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, western juniper, and buckbrush.

This unit is suited to homesite development. It has few limitations. Onsite sewage disposal systems may not

function properly because of the moderately slow permeability of the subsoil. Shrinking and swelling with alternate drying and wetting may be a problem in constructing buildings and roads.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIe-4(21), irrigated, and IIIe-4(21), nonirrigated.

143—Dubakella-Ipish complex, 5 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Dubakella stony loam and 30 percent Ipish gravelly clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to the Dubakella soil but are underlain by serpentine rock at a depth of 10 to 20 inches, soils that formed in residuum derived from basic igneous rock, and soils that are gravelly throughout. Also included are small areas of Weitchpec Variant gravelly loam and Rock outcrop. Included areas make up about 30 percent of the total acreage.

The Dubakella soil is moderately deep and well drained. It formed in residuum derived dominantly from serpentine rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is pale brown stony loam about 11 inches thick. The subsoil is brown very gravelly clay loam about 25 inches thick. Bedrock is at a depth of 36 inches. A few stones are on the surface in most places.

Permeability of the Dubakella soil is slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Ipish soil is very deep and well drained. It formed in residuum derived dominantly from serpentine rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/4 inch thick. The surface layer is dark brown gravelly loam about 2 inches thick. The upper part of the subsoil is dark brown gravelly clay loam about 42 inches thick. The lower part is dark brown very gravelly clay loam about 21 inches thick. Bedrock is at a depth of 65 inches.

Permeability of the Ipish soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 to 80 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland and for livestock grazing.

This unit is poorly suited to use as woodland. It can produce about 1,180 cubic feet, or 5,250 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Jeffrey pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion and low fertility. Trees on the Dubakella soil are subject to windthrow. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

Jeffrey pine is a suitable tree to plant on this unit. Reforestation is limited mainly by low fertility.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes manzanita, bottlebrush squirreltail, beardless wheatgrass, bluebunch wheatgrass, and Idaho fescue.

This map unit is in capability subclass VIIs(5), nonirrigated.

144—Dubakella-Ipish complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Dubakella stony loam and 30 percent Ipish gravelly clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to this Dubakella soil but are underlain by serpentine at a depth of 10 to 20 inches, soils that formed in residuum of basic igneous rock, and a soil that is gravelly throughout. Also included are small areas of Weitchpec Variant gravelly loam and Rock outcrop. Included areas make up about 30 percent of the total acreage.

The Dubakella soil is moderately deep and well drained. It formed in residuum derived dominantly from serpentine rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is pale brown stony loam about 11 inches thick. The subsoil is brown very gravelly clay loam about 25 inches thick. Bedrock is at a depth of 36 inches. A few stones are on the surface in most places.

Permeability of the Dubakella soil is slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Ipish soil is very deep and well drained. It formed in residuum derived dominantly from serpentine. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/4 inch thick. The surface layer is dark brown gravelly loam about 2 inches thick. The upper part of the subsoil is dark brown gravelly clay loam about 42 inches thick. The lower part is dark brown very gravelly clay loam about 21 inches thick. Bedrock is at a depth of 65 inches.

Permeability of the Ipish soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 60 to 80 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is poorly suited to use as woodland. It can produce about 1,180 cubic feet, or 5,250 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Jeffrey pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, slope, and low fertility. Trees on the Dubakella soil are subject to windthrow. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Conventional methods of harvesting trees are difficult to use because of the steepness of slope.

Jeffrey pine is a suitable tree to plant on this unit. Reforestation is limited mainly by low fertility.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes manzanita, bottlebrush squirreltail, beardless wheatgrass, bluebunch wheatgrass, and Idaho fescue. Livestock grazing should be managed to protect the soil in this unit from excessive erosion.

This map unit is in capability subclass VIIs(5), nonirrigated.

145—Dumps. Dumps consists of uneven piles of waste rock from dredging operations. It is mainly on flood plains and in channels of the major streams in the survey area. Large areas are along the Scott River.

The hazards of erosion and deposition are very high, and the areas are subject to flooding under abnormal conditions. Without major reclamation, areas of this unit cannot support plants.

Included in this unit are small areas of Xerofluvents, Riverwash, Rock outcrop, and Rubble land. These included areas make up about 20 percent of the mapped acreage.

This unit is used for wildlife habitat and watershed.

This map unit is in capability subclass VIIIs(21), nonirrigated.

146—Duzel gravelly loam, 5 to 9 percent slopes. This moderately deep, well drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly perennial grasses, shrubs, forbs, and scattered juniper. Elevation is 2,200 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown gravelly loam about 13 inches thick. The upper 17 inches of the subsoil is dark brown and brown gravelly loam. The lower 8 inches is reddish brown very gravelly clay loam. Weathered rock is at a depth of 38 inches.

Included in this unit are small areas of Hilt sandy loam, Marpa gravelly loam, Facey loam, Jilson gravelly loam, Rock outcrop, and a soil that is similar to this Duzel soil but has slopes of as much as 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Duzel soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and for homesite development.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, and western juniper.

This unit is suited to homesite development. The main limitations are moderately slow permeability and the gravelly texture of the surface layer. Removal of pebbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Because of limited soil depth and moderately slow permeability, onsite investigation is required to determine if an onsite waste disposal system will function properly.

This map unit is in capability unit IIIe-4(5), nonirrigated.

147—Duzel gravelly loam, 9 to 15 percent slopes. This moderately deep, well drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly perennial grasses, shrubs, forbs, and scattered juniper. Elevation is 2,200 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown gravelly loam about 13 inches thick. The upper 17 inches of the subsoil is dark brown and brown gravelly loam. The lower 8 inches is reddish brown very gravelly clay loam. Weathered rock is at a depth of 38 inches.

Included in this unit are small areas of Hilt sandy loam, Marpa gravelly loam, Facey loam, Rock outcrop, and a soil that is similar to this Duzel soil but has slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Duzel soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and for homesite development.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, and western juniper.

This unit is suited to homesite development. The main limitations are depth to rock, moderately slow permeability, slope, and the gravelly texture of the surface layer. The deep cuts needed to provide essentially level building sites can expose bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

Removal of pebbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Because of limited soil depth, slope, and moderately slow permeability, onsite investigation is required to determine if an onsite waste disposal system will function properly.

This map unit is in capability unit IIIe-4(5), nonirrigated.

148—Duzel-Jilson-Facey complex, 15 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed perennial grasses, shrubs, forbs, and juniper. Elevation is 2,200 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Duzel gravelly loam, 30 percent Jilson gravelly loam, and 20 percent Facey loam.

Included in this unit are small areas of Hilt sandy loam, Rock outcrop, and Rubble land. Included areas make up about 10 percent of the total acreage.

The Duzel soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface layer is dark brown gravelly loam about 13 inches thick. The upper 17 inches of the subsoil is dark brown and brown gravelly loam. The lower 8 inches is reddish brown very gravelly clay loam. Weathered rock is at a depth of 38 inches.

Permeability of the Duzel soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Jilson soil is shallow and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface layer is brown gravelly loam about 3 inches thick. The subsoil is brown and yellowish brown gravelly loam about 11 inches thick. Bedrock is at a depth of 14 inches.

Permeability of the Jilson soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Facey soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface layer is dark grayish brown and grayish brown loam about 10 inches thick. The subsoil is brown, yellowish brown, and very pale brown clay loam about 49 inches thick. Bedrock is at a depth of 59 inches.

Permeability of the Facey soil is moderately slow. Available water capacity is low to high. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The main limitations are slope and the hazard of erosion. The Jilson soil is also limited by shallow depth. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails and walkways can be constructed in places to encourage livestock grazing in areas where access is limited. Range seeding is a suitable practice if the range vegetation is in poor condition. Livestock grazing should be managed to protect the unit from excessive erosion. Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing.

The potential plant community on the Duzel and Facey soils includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and western juniper. The potential plant community on the Jilson soil includes bottlebrush squirreltail, Thurber needlegrass, western juniper, and bluebunch wheatgrass.

This map unit is in capability subclass VIe(5), nonirrigated.

149—Esro silt loam. This very deep, very poorly drained soil is in basins. It formed in alluvium derived from extrusive igneous rock. Slope is 0 to 2 percent. The native vegetation is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

Typically, the surface layer is dark gray and gray silt loam about 32 inches thick. The upper 14 inches of the underlying material is gray and light gray silt loam. The lower part to a depth of 79 inches or more is very pale

brown and light brownish gray sandy loam and light brownish gray sandy clay loam.

Included in this unit are small areas of sandy loam and gravelly loam overwash 10 to 15 inches thick. Included areas make up about 10 percent of the total acreage.

Permeability of this Esro soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is very slow. A seasonal high water table is at a depth of 0 to 12 inches from December through August. This soil is subject to very long periods of flooding from January through June.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the high water table and the hazard of flooding. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Such plants must be able to withstand long periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes tufted hairgrass, clover, and northern mannagrass.

This map unit is in capability subclass Vw(22), nonirrigated.

150—Esro silt loam, drained. This very deep, very poorly drained soil is in basins. It formed in alluvium derived from extrusive igneous rock. Slope is 0 to 2 percent. The native vegetation is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

Typically, the surface layer is dark gray and gray silt loam about 32 inches thick. The upper 14 inches of the underlying material is gray and light gray silt loam. The lower part to a depth of 79 inches or more is very pale brown and light brownish gray sandy loam and light brownish gray sandy clay loam.

Included in this unit are small areas of gravelly sandy loam, silt overwash about 10 to 15 inches thick, and a soil that is similar to this Esro soil but has slopes of as much as 5 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Esro soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is very slow. A seasonal high water table fluctuates between depths of 24 and 48 inches from December through July. This soil is subject to rare periods of flooding.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the seasonal high water table. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes tufted hairgrass, clover, and northern mannagrass.

This map unit is in capability unit IVw-2(22), nonirrigated.

151—Etsel very gravelly loam, 30 to 75 percent slopes. This very shallow, somewhat excessively drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly brush. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is pale brown very gravelly loam about 7 inches deep over fractured bedrock.

Included in this unit are small areas of a soil that is similar to this Etsel soil but is underlain by bedrock at a depth of 10 to 20 inches, Neuns gravelly loam, Kindig gravelly loam, Kinkel very gravelly loam, a soil that has slopes of 2 to 15 percent, and Rock outcrop. Included areas make up about 25 percent of the total acreage.

Permeability of this Etsel soil is moderate. Available water capacity is very low. Effective rooting depth is 6 to 10 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by shallow soil depth, very low available water capacity, and the hazard of erosion. The soil in this unit has a strong tendency to support brush. If the brush is managed to create open areas, the soil produces a stand of desirable grasses and forbs. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Livestock grazing should be managed to protect the soil from excessive erosion. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and brush management.

The potential plant community on this unit includes mountain brome, ceanothus, and manzanita.

This map unit is in capability subclass VIIe(5), nonirrigated.

152—Facey loam, 5 to 15 percent slopes. This deep, well drained soil is on toe slopes of mountains. It formed in colluvium derived dominantly from metamorphosed rock. The native vegetation is mainly perennial grasses, shrubs, forbs, and a few scattered juniper trees. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown and grayish brown loam about 10 inches thick. The subsoil is brown, yellowish brown, and very pale brown clay loam about 49 inches thick. Bedrock is at a depth of 59 inches.

Included in this unit are small areas of Bonnet soils that have slopes of 5 to 15 percent, Jilson gravelly loam, and a soil that is similar to this Facey soil but has bedrock at a depth of more than 60 inches. Also included are a few areas of soils that have slopes of 15 to 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Facey soil is moderately slow. Available water capacity is low to high. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development. The main crops are irrigated and nonirrigated wheat and barley.

This unit is suited to crops commonly grown in the area. It is limited mainly by slope. Sprinkler or contour ditch irrigation is suited to the unit. The method used generally is governed by the crop grown. Pipe, ditch lining, or drop structures should be installed in irrigation ditches to facilitate irrigation and prevent excessive ditch erosion. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. All tillage should be on the contour or across the slope.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If the shrubs are managed to create open areas, the soil produces a good stand of desirable grasses and forbs.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, Idaho fescue, bluebunch wheatgrass, and beardless wheatgrass.

This unit is suited to homesite development. The main limitations are load supporting capacity, shrink-swell potential, moderately slow permeability, and slope. Only the part of the site that is used for construction should be disturbed. Plans for homesite development should provide for the preservation of as many trees as possible. Establishing and maintaining plant cover can be achieved through proper fertilizing, seeding, mulching, and shaping of the slopes.

If this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. The steepness of slope is a concern in installing absorption fields. Absorption lines should be installed on the contour.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability unit IIIe-1(21), irrigated and nonirrigated.

153—Gazelle silt loam. This very poorly drained soil is in basins. It is moderately deep to a hardpan. The soil formed in alluvium derived from mixed rock sources and is slightly affected by salts. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly salt-tolerant grasses, shrubs, and forbs. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray and light gray, strongly alkaline silt loam about 11 inches thick. The upper 14 inches of the underlying material is white silt loam. The next 13 inches is a white, strongly cemented hardpan. The lower part to a depth of 60 inches or more is white silt loam. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Montague clay and Salisbury clay loam. Also included are a few areas of soils that are similar to this Gazelle soil but are free of salts or are moderately affected by salts and contain sodium. Included areas make up about 15 percent of the total acreage.

Permeability of this Gazelle soil is moderately rapid above the hardpan. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is very slow. A seasonal high water table is at a depth of 0 to 18 inches from December through March. This soil is subject to long periods of flooding from November through May.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to hay and pasture. The main limitations are slight salinity, depth to the hardpan, the seasonal high water table, and the hazard of flooding.

The concentration of salts in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table; however, the concentration of salts can be reduced if drainage is provided and an adequate irrigation water management program is followed. Sprinkler irrigation is the most suitable method of applying water. Salt-tolerant species are most suitable for planting.

The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The main limitations are the seasonal high water table and slight salinity. The soil in this unit responds well to range seeding and to proper grazing use. Plants that tolerate wetness and slight salinity should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes inland saltgrass, carex, and rush.

This unit is poorly suited to homesite development. The main limitations are salinity, the hazard of flooding, depth to the hardpan, and the seasonal high water table. Plants that tolerate a high water table and slight salinity should be selected to establish lawns, shrubs, trees, and vegetable gardens. Drainage is needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.

Drainage is needed if roads and building foundations are constructed. Flooding can be controlled only by use of major flood control structures. The hardpan is rippable and therefore is not a serious limitation for most engineering uses.

Onsite sewage disposal systems often fail or do not function properly during periods of high rainfall because of the hardpan. The high water table increases the possibility of failure of septic tank absorption fields.

This map unit is in capability subclass Vw(21), irrigated and nonirrigated.

154—Gazelle Variant sandy clay loam. This very poorly drained soil is in basins. It is shallow to a hardpan. The soil formed in alluvium derived from mixed rock sources. It is slightly affected by salts. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly salt-tolerant grasses, shrubs, and forbs. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray sandy clay loam about 12 inches thick. The next layer is a light brownish gray and dark grayish brown, moderately cemented hardpan about 6 inches thick. The underlying material to a depth of 60 inches or more is white silt loam.

Included in this unit are small areas of Montague clay and Salisbury clay loam. Also included are a few areas of soils that are similar to this Gazelle Variant soil but are free of salts or are moderately or strongly affected by salts and contain sodium in places. Included areas make up about 15 percent of the total acreage.

Permeability of this Gazelle Variant soil is moderately slow above the hardpan. Available water capacity is very low to low. Effective rooting depth is 10 to 20 inches. Runoff is very slow. A seasonal high water table is at a depth of 0 to 12 inches from December through April. This soil is subject to brief periods of flooding in December and January.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is poorly suited to irrigated and nonirrigated hay and pasture. The main limitations are salinity, depth to the hardpan, the seasonal high water table, and the hazard of flooding. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table. However, the concentration of salts can be reduced if drainage is provided and an irrigation water management program is followed. Salt-tolerant species are most suitable for planting.

The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

This unit is suited to use as rangeland. The main limitations are the seasonal high water table, salinity, and the hazard of flooding. The soil in this unit responds well to range seeding and to proper grazing use. Plants that tolerate wetness and salinity should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes inland saltgrass, carex, and rush.

This unit is poorly suited to homesite development. The main limitations are salinity, the hazard of flooding, depth to the hardpan, and the seasonal high water table. Plants that tolerate a high water table and slight salinity should be selected to establish lawns, shrubs, trees, and vegetable gardens. Drainage is needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.

Drainage is needed if roads and building foundations are constructed. Flooding can be controlled only by use of major flood control structures. The hardpan is rippable and therefore is not a serious limitation for most engineering uses.

Onsite sewage disposal systems often fail or do not function properly during periods of high rainfall because of the hardpan. The high water table increases the possibility of failure of septic tank absorption fields.

This map unit is in capability subclass VIw(21), irrigated and nonirrigated.

155—Hilt sandy loam, 2 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from sandstone. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown and brown sandy loam about 11 inches thick. The subsoil is dark brown and yellowish red sandy clay loam about 27 inches thick. Weathered rock is at a depth of 38 inches. Unweathered bedrock is at a depth of 47 inches.

Included in this unit are small areas of Kinkel very gravelly loam, soils that have been subject to severe sheet erosion, Rock outcrop, and a soil that is similar to this Hilt soil but has slopes of as much as 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Hilt soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for nonirrigated cultivated crops and as rangeland.

This unit is suited to nonirrigated wheat and barley. It is limited mainly by slope and the hazard of erosion. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. Tilth and fertility can be improved by returning crop residue to the soil.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, Idaho fescue, and rubber rabbitbrush.

This map unit is in capability unit IIIe-1(21), nonirrigated.

156—Hilt sandy loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from sandstone. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown and brown sandy loam about 11 inches thick. The subsoil is dark brown and yellowish red sandy clay loam about 27 inches thick. Weathered rock is at a depth of 38 inches. Unweathered bedrock is at a depth of 47 inches.

Included in this unit are small areas of Kinkel very gravelly loam, Terwilliger silty clay loam, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Hilt soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for nonirrigated cultivated crops and as rangeland.

This unit is suited to nonirrigated wheat and barley. It is limited mainly by slope and the hazard of erosion. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. Tilth and fertility can be improved by returning crop residue to the soil.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, Idaho fescue, and rubber rabbitbrush.

This map unit is in capability unit IVe-1(21), nonirrigated.

157—Hilt stony sandy loam, 2 to 50 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from sandstone. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown and brown stony sandy loam about 11 inches thick. The subsoil is dark brown and yellowish red sandy clay loam about 27 inches thick. Weathered rock is at a depth of 38 inches.

Unweathered bedrock is at a depth of 47 inches. A few stones are on the surface in most places.

Included in this unit are small areas of Jilson gravelly loam, Terwilliger silty clay loam, Rubble land, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Hilt soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope and the hazard of erosion. Livestock grazing should be managed to protect the unit from excessive erosion.

Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited. Grazing should be delayed until the soil in the unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, beardless wheatgrass, bluebunch wheatgrass, and ceanothus.

This map unit is in capability subclass VIe(21), nonirrigated.

158—Hilt-Rock outcrop complex, 2 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,000 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 45 percent Hilt stony sandy loam and 35 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Jilson gravelly loam, Terwilliger silty clay loam, and Rubble land. Included areas make up about 20 percent of the total acreage.

The Hilt soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is dark brown and brown stony sandy loam about 11 inches thick. The subsoil is dark brown and yellowish red sandy clay loam about 27 inches thick. Weathered rock is at a depth of 38 inches. Unweathered bedrock is at a depth of 47 inches. A few stones are on the surface in most places.

Permeability of the Hilt soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Rock outcrop consists of exposures of bare bedrock.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited mainly by slope, the hazard of erosion, and the areas of Rock outcrop. Use of mechanical treatment practices is not practical, because of the areas of Rock outcrop. Livestock grazing should be managed to protect the unit from excessive erosion.

Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails can be constructed in places to encourage livestock grazing in areas where access is limited. Grazing should be delayed until the soil in the unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, beardless wheatgrass, bluebunch wheatgrass, and ceanothus.

This map unit is in capability subclass VIIe(21), nonirrigated.

159—Jenny clay, 0 to 2 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray clay about 16 inches thick. The upper 7 inches of the underlying material is dark grayish brown clay. The lower part to a depth of 60 inches or more is brown clay loam and mixed light brownish gray and white loam. The lower part of the underlying material is calcareous.

Included in this unit are small areas of Lassen clay that has slopes of 0 to 2 percent, Pit clay in small basins, and Medford clay loam on fans. Included areas make up about 15 percent of the total acreage.

Permeability of this Jenny soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by fine texture and slow permeability. If the unit is dryfarmed, precipitation is not sufficient for annual cropping; thus, a cropping system that includes small grain and summer fallow is most

suitable. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. Because of the slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage the crops.

This unit is suited to hay and pasture. The main limitations are shrink-swell potential and susceptibility of the soil to compaction. Plants that tolerate shrinking and swelling should be seeded. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by shrink-swell potential and susceptibility of the soil to compaction. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded.

The potential plant community on this unit includes bluebunch wheatgrass, Idaho fescue, sheep fescue, bulbous bluegrass, and sulphurflower.

This unit is suited to homesite development. The main limitations are shrink-swell potential, load supporting capacity, and slow permeability. If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Septic tank absorption fields do not function properly during rainy periods because of the slow permeability. This limitation can be overcome by increasing the size of the absorption field.

This map unit is in capability units IIs-5(21), irrigated, and IIIs-5(21), nonirrigated.

160—Jenny clay, 2 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray clay about 16 inches thick. The upper 7 inches of the underlying material is dark grayish brown clay. The lower part to a depth of 60 inches or more is brown clay loam and mixed light brownish gray and white loam. The lower part of the underlying material is calcareous.

Included in this unit are small areas of Kuck clay loam and Lassen clay on hills and Medford clay loam on alluvial fans. Included areas make up about 15 percent of the total acreage.

Permeability of this Jenny soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slope, the hazard of erosion, slow permeability, and fine soil texture. If the unit is dryfarmed, precipitation is not sufficient for annual cropping; thus, a cropping system that includes small grain and summer fallow is most suitable. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Because of the slope and slow permeability of the soil in this unit, sprinkler or contour ditch irrigation is the most suitable method of applying water. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum.

This unit is suited to hay and pasture. The main limitations are shrink-swell potential and the susceptibility of the soil to compaction. Plants that tolerate shrinking and swelling should be seeded. Grazing should be delayed until the soil has dried sufficiently and is firm enough to withstand trampling by livestock. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of nitrogen and phosphorus fertilizer promotes good growth of forage plants.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the shrink-swell potential and the susceptibility of the soil to compaction. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded.

The potential plant community on this unit includes bluebunch wheatgrass, Idaho fescue, sheep fescue, bulbous bluegrass, and sulphurflower.

This unit is suited to homesite development. The main limitations are the shrink-swell potential, load supporting capacity, slow permeability, slope, and the hazard of erosion, especially in the steeper areas.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Structures to divert runoff are also needed if roads are constructed. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

If septic tank sewage disposal systems are used, the limitation of slow permeability can be overcome by increasing the size of the absorption field.

Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

161—Jenny cobbly clay, 0 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray cobbly clay about 16 inches thick. The upper 7 inches of the underlying material is dark grayish brown clay. The lower part to a depth of 60 inches or more is brown clay loam and mixed light brownish gray and white loam. The lower part of the underlying material is calcareous. A few cobbles are on the surface in most places.

Included in this unit are small areas of Kuck clay loam and Lassen clay on hills. Also included are small areas of Medford clay loam, on fans, that has slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Jenny soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley if the cobbles are removed from the surface. It is limited mainly by the hazard of erosion, cobbles, fine soil texture, and slow permeability. If the unit is dryfarmed, precipitation is not sufficient for annual cropping; thus, a cropping system that includes small grain and summer fallow is most suitable. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Because of the slope and slow permeability, sprinkler, contour ditch, border, or corrugation irrigation is best suited to the soil in this unit. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum. The use of equipment is limited by the cobbles on the surface.

This unit is suited to hay and pasture. The main limitations are shrink-swell potential and susceptibility of the soil to compaction. Plants that tolerate shrinking and swelling should be seeded. Grazing should be delayed until the soil has dried sufficiently and is firm enough to withstand trampling by livestock. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of nitrogen and phosphorus fertilizer promotes good growth of forage plants.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by shrink-swell potential and susceptibility of the soil to compaction. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded.

The potential plant community on this unit includes bluebunch wheatgrass, bottlebrush squirreltail, Idaho fescue, and western juniper.

This unit is suited to homesite development. The main limitations are the shrink-swell potential, load supporting capacity, slow permeability, slope, and the hazard of erosion, which is greater in the steeper areas.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Structures to divert runoff also are needed if roads are constructed. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

If septic tank absorption fields are used, the limitation of slow permeability can be overcome by increasing the size of the absorption field.

Preserving the existing plant cover during construction helps to control erosion. Only the part of the site that is used for construction should be disturbed. Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used

for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

162—Jilson gravelly loam, 50 to 65 percent slopes. This shallow, well drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly perennial grasses, shrubs, forbs, and juniper trees. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is brown gravelly loam about 3 inches thick. The subsoil is brown and yellowish brown gravelly loam about 11 inches thick. Fractured bedrock is at a depth of 14 inches.

Included in this unit are small areas of Rubble land and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Jilson soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope, the hazard of erosion, shallow soil depth, and very low available water capcacity. The suitability of this unit for rangeland seeding is limited by the steepness of slope. Livestock grazing should be managed to protect the soil from excessive erosion.

Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

The potential plant community on this unit includes bottlebrush squirreltail, cheatgrass, Thurber needlegrass, western juniper, and bluebunch wheatgrass.

This map unit is in capability subclass VIIe(5), nonirrigated.

163—Jilson-Duzel gravelly loams, 5 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly perennial grasses, shrubs, forbs, and juniper trees. Elevation is 2,200 to 5,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 125 days.

This unit is 35 percent Jilson gravelly loam and 30 percent Duzel gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 20 percent Rock outcrop, 15 percent Facey loam, and a few small areas of Marpa gravelly loam. Included areas make up about 35 percent of the total acreage.

The Jilson soil is shallow and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface layer is brown gravelly loam about 3 inches thick. The subsoil is brown and yellowish brown gravelly loam about 11 inches thick. Fractured bedrock is at a depth of 14 inches.

Permeability of the Jilson soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Duzel soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface layer is dark brown gravelly loam about 13 inches thick. The upper 17 inches of the subsoil is dark brown and brown gravelly loam. The lower part is reddish brown very gravelly clay loam about 8 inches thick. Weathered rock is at a depth of 38 inches.

Permeability of the Duzel soil is moderately slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope and the hazard of erosion. Shallow rooting depth is also a limitation on the Jilson soil.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Livestock grazing should be managed to protect the soils in this unit from excessive erosion. Management practices suitable for use on these soils are proper range use, deferred grazing, and rotation grazing.

The potential plant community on the Jilson soil includes bottlebrush squirreltail, cheatgrass, Thurber needlegrass, western juniper, and bluebunch wheatgrass. On the Duzel soil it includes bluebunch wheatgrass, beardless wheatgrass, and western juniper.

This map unit is in capability subclass VIIe(5), nonirrigated.

164—Kindig-Neuns gravelly loams, 15 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 6,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 100 to 125 days.

This unit is 45 percent Kindig gravelly loam and 30 percent Neuns gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Rock outcrop and 10 percent Etsel very gravelly loam that has slopes of as much as 75 percent, a Marpa soil that has a loam surface layer, and a soil that is similar to the Kindig soil but is more than 60 inches deep to bedrock. Included areas make up about 25 percent of the total acreage.

The Kindig soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is brown gravelly loam about 5 inches thick. The upper part of the subsoil is pale brown gravelly loam about 10 inches thick. The lower part is light yellowish brown very gravelly loam about 45 inches thick. Weathered rock is at a depth of 60 inches.

Permeability of the Kindig soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Neuns soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and light yellowish brown gravelly loam about 8 inches thick. The subsoil is yellowish brown and pale brown very gravelly loam about 27 inches thick. Fractured bedrock is at a depth of 35 inches.

Permeability of the Neuns soil is moderate. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is moderately suited to the production of ponderosa pine, Douglas-fir, and sugar pine. The Kindig soil can produce about 9,124 cubic feet, or 29,440 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old. The Neuns soil can produce about 8,607 cubic feet, or 26,050 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old.

The main concerns in producing and harvesting timber are equipment limitations, the hazard of erosion, and plant competition. Conventional methods of harvesting trees can be used in the more gently sloping areas, but they are difficult to use in the steeper areas. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes oak, deerbrush, manzanita, squawcarpet, and fescue. Livestock grazing should be managed to protect the soils in the unit from excessive erosion.

This map unit is in capability subclass VIe(5), nonirrigated.

165—Kindig-Neuns gravelly loams, 50 to 80 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 6,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is 100 to 125 days.

This unit is 60 percent Kindig gravelly loam and 30 percent Neuns gravelly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Etsel very gravelly loam, a Marpa soil that has a loam surface layer, a soil that is similar to the Kindig soil but is more than 60 inches deep to bedrock, and Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Kindig soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is brown gravelly loam about 5 inches thick. The upper part of the subsoil is pale brown gravelly loam about 10 inches thick. The lower part is light yellowish brown very gravelly loam about 45 inches thick. Weathered rock is at a depth of 60 inches.

Permeability of the Kindig soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is very high.

The Neuns soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris

about 2 inches thick. The surface layer is dark brown and light yellowish brown gravelly loam about 8 inches thick. The subsoil is yellowish brown and pale brown very gravelly loam about 27 inches thick. Fractured bedrock is at a depth of 35 inches.

Permeability of the Neuns soil is moderate. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and sugar pine. The Kindig soil can produce about 9,124 cubic feet, or 29,440 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old. The Neuns soil can produce about 8,607 cubic feet, or 26,050 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, slope, and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

The steepness of slope limits the kinds of equipment that can be used in forest management. The high-lead logging method is more efficient than most other methods and is less damaging to the soil surface.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes oak, deerbrush, squawcarpet, manzanita, and fescue. Livestock grazing should be managed to protect the soils in the unit from excessive erosion.

This map unit is in capability subclass VIIe(5), nonirrigated.

166—Kinkel very gravelly loam, 2 to 15 percent slopes. This very deep, well drained soil is on mountains. It formed in residuum derived dominantly from metamorphosed rock. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is grayish brown and brown very gravelly loam about 9 inches thick. The subsoil is light yellowish brown, light brown, brown, strong brown, and reddish yellow very gravelly loam about 51 inches thick.

Included in this unit are small areas of Boomer and Marpa soils that have a very gravelly loam surface layer and slopes of as little as 2 percent. Also included are small areas of a soil that is similar to this Kinkel soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinkel soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,998 cubic feet, or 13,460 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The soil in this unit has few limitations for use and management. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory includes deerbrush, needlegrass, buckbrush, and common snowberry.

This map unit is in capability unit IVs-4(5), nonirrigated.

167—Kuck clay loam, 2 to 9 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown clay loam about 6 inches thick. The upper 14 inches of the subsoil is dark gray clay loam and clay. The lower 12 inches is dark grayish brown gravelly clay loam. Weathered rock is at a depth of 32 inches.

Included in this unit are small areas of Jenny clay on terraces and Lassen clay on hills. Included areas make up about 15 percent of the total acreage.

Permeability of this Kuck soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion,

low to moderate available water capacity, slow permeability, and slope.

In summer, irrigation is required for maximum production of most crops. Because of slope, moderate soil depth, and slow permeability, sprinkler and contour ditch irrigation systems are best suited to this unit. The method used generally is governed by the crop grown. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

This unit is suited to hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil in this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the clayey texture of the surface layer and low to moderate available water capacity. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, Idaho fescue, sheep fescue, and western juniper.

This unit is poorly suited to homesite development. The main limitations are depth to rock, low load supporting capacity, slow permeability, and shrink-swell potential. The deep cuts needed to provide essentially level building sites can expose bedrock.

Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Where septic tank absorption fields are used, the limitations of slow permeability and moderate depth to rock can be overcome by increasing the size of the absorption field.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability unit IIIe-1(21), irrigated and nonirrigated.

168—Kuck clay loam, 9 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown clay loam about 6 inches thick. The upper 14 inches of the subsoil is dark gray clay loam and clay. The lower 12 inches is dark grayish brown gravelly clay loam. Weathered rock is at a depth of 32 inches.

Included in this unit are small areas of Jenny clay on terraces and Lassen clay on hills. Included areas make up about 15 percent of the total acreage.

Permeability of this Kuck soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion, low to moderate available water capacity, slow permeability, and slope. In summer, irrigation is required for maximum production of most crops. Contour ditch and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

If this unit is suited to hay and pasture, the main limitation is slope. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Seedbed preparation should be on the contour or across the slope where practical.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, Idaho fescue, sheep fescue, and western juniper.

This unit is poorly suited to homesite development. The main limitations are limited depth to rock, low load supporting capacity, slow permeability, shrink-swell potential, and slope. The deep cuts needed to provide essentially level building sites can expose bedrock.

Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Where septic tank absorption fields are used, the limitations of slow permeability and moderate depth to rock can be overcome by increasing the size of the absorption field.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability unit IIIe-1(21), irrigated and nonirrigated.

169—Lassen clay, 2 to 9 percent slopes. This moderately deep, well drained soil is on hills (fig. 1). It formed in residuum derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak and juniper. Elevation is 2,000 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown clay about 26 inches thick. The underlying material is dark grayish brown gravelly clay about 2 inches thick. Bedrock is at a depth of 28 inches.

Included in this unit are small areas of Jenny clay on terraces and Kuck clay on hills. Included areas make up about 15 percent of the total acreage.

Permeability of this Lassen soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion, fine soil texture, depth to rock, slow permeability, and slope. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Because of slope, soil depth, and slow permeability, sprinkler and contour ditch irrigation systems are best suited to the soil in this unit. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

Figure 1.—Area of Lassen clay, 2 to 9 percent slopes, in foreground; Lassen cobbly clay, 2 to 15 percent slopes, on the foot slopes in background, and Mary-Rock outcrop complex, 2 to 50 percent slopes, on ridgetops.

Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum.

This unit is suited to hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of nitrogen and phosphorus fertilizer promotes good growth of forage plants.

This unit is suited to use as rangeland. The main limitation is shrink-swell potential. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate shrinking and swelling should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and sheep fescue.

This unit is suited to homesite development. The main limitations are soil depth, slow permeability, shrink-swell potential, and low load supporting capacity.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock.

Where septic tank absorption fields are used, the limitations of slow permeability and moderate soil depth can be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

170—Lassen clay, 9 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak and juniper. Elevation is 2,000 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown clay about 26 inches thick. The underlying material is dark grayish brown gravelly clay about 2 inches thick. Bedrock is at a depth of 28 inches.

Included in this unit are small areas of Montague clay that has slopes of 2 to 9 percent, Jenny clay on terraces, Kuck clay loam on hills, Rock outcrop, and areas of a soil that is similar to this Lassen soil but has slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Lassen soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion, fine soil texture, depth to rock, slow permeability, and slope. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Because of slope, soil depth, and slow permeability, sprinkler and contour ditch irrigation systems are best suited to the soil in this unit. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum.

This unit is suited to hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of nitrogen and phosphorus fertilizer promotes good growth of forage plants.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by shrink-swell potential and susceptibility of the soil to compaction. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate shrinking and swelling should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and sheep fescue.

This unit is suited to homesite development. The main limitations are moderate soil depth, slow permeability, shrink-swell potential, and low load supporting capacity.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load. Structures to divert runoff are needed if roads are constructed. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock.

If septic tank absorption fields are used, the limitations of slow permeability and moderate depth to rock can be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

171—Lassen cobbly clay, 2 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, forbs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown cobbly clay about 26 inches thick. The underlying material is dark grayish brown cobbly clay about 2 inches thick. Bedrock is at a depth of 28 inches.

Included in this unit are small areas of Montague clay, Jenny clay, Kuck clay loam, Rock outcrop, and a soil that is similar to this Lassen soil but has slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Lassen soil is slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion, fine soil texture, depth to rock, slow permeability, cobbles, and slope. Tillage should be performed when the moisture content is about 50 percent of field capacity.

Because of slope, soil depth, and slow permeability, sprinkler and contour ditch irrigation systems are best suited to the soil in this unit. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum. The use of equipment is limited by the cobbles on the surface.

This unit is suited to hay and pasture. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of nitrogen and phosphorus fertilizer promotes good growth of forage plants.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by shrink-swell potential and susceptibility of the soil to compaction.

The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded.

The potential plant community on this unit includes sulphurflower, beardless wheatgrass, Idaho fescue, and bluebunch wheatgrass.

This unit is suited to homesite development. The main limitations are moderate soil depth, slow permeability, shrink-swell potential, and low load supporting capacity. The deep cuts needed to provide essentially level building sites can expose bedrock.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Structures to divert runoff are also needed if roads are constructed. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

If septic tank absorption fields are used, the limitations of slow permeability and moderate soil depth can be overcome by increasing the size of the absorption field.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion.

This map unit is in capability unit IVe-5(21), irrigated and nonirrigated.

172—Lassen-Kuck complex, 15 to 50 percent slopes. This map unit is on hills. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 45 percent Lassen clay and 20 percent Kuck clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Rock outcrop and 20 percent small areas of Montague clay that has slopes of 2 to 9 percent and a soil that is similar to the Lassen soil but is very gravelly throughout. Included areas make up about 35 percent of the total acreage.

The Lassen soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark grayish brown clay about 26 inches thick. The underlying

material is dark grayish brown gravelly clay about 2 inches thick. Bedrock is at a depth of 28 inches.

Permeability of the Lassen soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Kuck soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark brown clay loam about 6 inches thick. The upper 14 inches of the subsoil is dark gray clay loam and clay. The lower 12 inches is dark grayish brown gravelly clay loam. Weathered rock is at a depth of 32 inches.

Permeability of this Kuck soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland and for homesite development.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope and shrink-swell potential. The soils in this unit respond well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soils have drained sufficiently and are firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded. Brush management improves deteriorated areas of range that are producing more woody shrubs than were present in the potential plant community. Livestock grazing should be managed to protect the unit from excessive erosion.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

The potential plant community on this unit includes bluebunch wheatgrass, Idaho fescue, sheep fescue, and western juniper.

This unit is poorly suited to homesite development. The main limitations are moderate soil depth, slow permeability, shrink-swell potential, and low load supporting capacity. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soils in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Structures to divert runoff are also needed if roads are constructed. Buildings and roads should be designed to offset the limited ability of the soils to support a load.

If septic tank absorption fields are used, the limitations of slow permeability and moderate depth to rock can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass VIe(21), nonirrigated.

173—Lassen-Kuck complex, stony, 2 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly perennial grasses, forbs, shrubs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 35 percent Lassen stony clay and 25 percent Kuck stony clay loam.

Included in this unit are about 20 percent soils that are similar to the Lassen soil but are very gravelly clay throughout, 10 percent Rock outcrop, and 10 percent Montague clay and Jenny clay. Included areas make up about 40 percent of the total acreage.

The Lassen soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark grayish brown stony clay about 9 inches thick. The underlying material is dark grayish brown cobbly clay about 19 inches thick. Bedrock is at a depth of 28 inches. A few stones are on the surface in most places.

Permeability of the Lassen soil is slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Kuck soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark brown stony clay loam about 6 inches thick. The upper 14 inches of the subsoil is dark gray stony clay loam and stony clay. The lower 12 inches is dark grayish brown stony clay loam. Weathered rock is at a depth of 32 inches. A few stones are on the surface in most places.

Permeability of the Kuck soil is slow. Available water capacity is low or moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland and for homesite development.

This unit is suited to rangeland. The production of vegetation suitable for livestock grazing is limited by slope, the hazard of erosion, and shrink-swell potential. Grazing should be delayed until the soils in this unit have drained sufficiently and are firm enough to withstand trampling by livestock. Brush management improves deteriorated areas of range that are producing more woody shrubs than were present in the potential plant community. Plants that tolerate shrinking and swelling should be seeded. Livestock grazing should be managed to protect the unit from excessive erosion.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Trails and walkways can be constructed in places to

encourage livestock grazing in areas where access is limited.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and western juniper.

This unit is poorly suited to homesite development. The main limitations are moderate soil depth, stoniness, low load supporting capacity, slow permeability, shrink-swell potential, and slope. The deep cuts needed to provide essentially level building sites can expose bedrock.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction helps to control erosion.

Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants. Removal of pebbles, cobbles, and stones in disturbed areas is required for best results when landscaping, particularly in areas used for lawns.

If buildings are constructed on the soils in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Structures to divert runoff are also needed if roads are constructed. Buildings and roads should be designed to offset the limited ability of the soils to support a load.

If septic tank absorption fields are used, the limitations of slow permeability and moderate depth to rock can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass VIe(21), nonirrigated.

174—Lassen-Rock outcrop-Kuck complex, 2 to 50 percent slopes. This unit is on hills. The native vegetation is mainly perennial grasses, forbs, shrubs, and scattered oak and juniper. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 25 percent Lassen very stony clay, 20 percent Rock outcrop, and 15 percent Kuck very stony clay loam.

Included in this unit are about 15 percent soils that are similar to this Lassen soil but are very gravelly clay throughout, 15 percent Montague clay, and 10 percent Jenny clay. Included areas make up about 40 percent of the total acreage.

The Lassen soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark grayish brown very stony clay about 9 inches thick. The underlying material is dark grayish brown cobbly clay about 19 inches thick. Bedrock is at a depth of 28 inches. Many stones are on the surface in most places.

Permeability of the Lassen soil is slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Rock outcrop consists of exposures of bedrock. Rock outcrop is barren of vegetation except for that in fractures in the rock.

The Kuck soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark brown very stony clay loam about 6 inches thick. The upper 14 inches of the subsoil is dark gray stony clay loam and stony clay. The lower 12 inches is dark grayish brown stony clay loam. Weathered rock is at a depth of 32 inches. Many stones are on the surface in most places.

Permeability of the Kuck soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by stoniness, the areas of Rock outcrop, the hazard of erosion, shrink-swell potential, and slope. Use of mechanical treatment practices is not practical because of the stones on the surface and the areas of Rock outcrop.

Grazing should be delayed until the soils in this unit have drained sufficiently and are firm enough to withstand trampling by livestock. Plants that tolerate shrinking and swelling should be seeded. Brush management improves deteriorated areas of range that are producing more woody shrubs than were present in the potential plant community.

Livestock grazing should be managed to protect the unit from excessive erosion. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and western juniper.

This map unit is in capability subclass VIIs(21), nonirrigated.

175—Lava flows. This map unit consists of sharp jagged surfaces, crevices, and angular lava blocks. It is in the Cascade Mountain Range. Soil material is in a few cracks and sheltered pockets. Slope is 9 to 50 percent. Drainage is excessive, and runoff is very rapid. Areas are nearly barren of vegetation.

Included in this unit are small areas of shallow and very shallow soils of various textures, Mary loam, Jilson gravelly loam, and areas of Lava flows where slopes are as much as 80 percent. Included areas make up about 15 percent of the mapped acreage.

Lava flows is used by wildlife.

This map unit is in capability subclass VIIIs(22), nonirrigated.

176—Lava flows-Xerorthents complex, 0 to 50 percent slopes. This map unit is on mountains. The vegetation is mainly brush, shrubs, annual grasses, and forbs. Elevation is dominantly 3,000 to 5,000 feet but ranges to nearly 8,300 feet on Goosenest Mountain. The average annual precipitation is 20 to 40 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free season is 60 to 125 days.

This unit is about 40 percent Lava flows and 30 percent Xerorthents.

Included in this unit are small areas of soils that are similar to Xerorthents but are underlain by bedrock at a depth of 40 to 60 inches. Also included are areas of Rubble land and Riverwash. Included areas make up about 30 percent of the mapped acreage.

Lava flows consists of sharp jagged surfaces, crevices, and angular lava blocks.

Xerorthents are very shallow to moderately deep, excessively drained soils that formed in residual material derived from basalt and andesite. These soils have a surface layer that is variable in texture and is underlain by bedrock at a depth of 8 to 40 inches.

This unit is used for wildlife habitat and watershed.

This map unit is in capability subclass VIIIs(22), nonirrigated.

177—Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes. This map unit is on mountains. The vegetation is mainly brush, shrubs, annual grasses, and forbs. Elevation ranges from 2,000 to 6,000 feet. The average annual precipitation is 20 to 50 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free season is 60 to 125 days.

This unit is about 40 percent Lithic Haploxerolls and 30 percent Rock outcrop.

Included in this unit are soils that are similar to Lithic Haploxerolls but have a clay loam or clay subsoil or are underlain by bedrock at a depth of 10 to 40 inches. Also included are areas of Rubble land and Riverwash. Included areas make up about 30 percent of the mapped acreage.

The Lithic Haploxerolls are very shallow, excessively drained soils that formed in residual material derived from intrusive igneous or metamorphic rock. These soils have a dark colored surface layer that is variable in texture and is underlain by bedrock at a depth of 8 to 10 inches. Reaction is slightly acid or neutral.

Rock outcrop consists of exposures of intrusive igneous or metamorphic rock that is barren of vegetation.

This unit is used for wildlife habitat and watershed.

This map unit is in capability subclass VIIIs(5,22), nonirrigated.

178—Lithic Xerorthents-Rock outcrop complex, 0 to 65 percent slopes. This map unit is on mountains. The vegetation is mainly brush, shrubs, annual grasses, and forbs. Elevation is 2,000 to 6,000 feet. The average annual precipitation is 20 to 50 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free season is 50 to 125 days.

This unit is about 40 percent Lithic Xerorthents and 30 percent Rock outcrop.

Included in this unit are small areas of soils that are similar to Lithic Xerorthents but are 10 to 40 inches deep to bedrock, Rubble land, Riverwash, and areas where slopes are more than 65 percent. These included areas make up about 30 percent of the mapped acreage.

Lithic Xerorthents are very shallow and excessively drained. They formed in residual material derived from intrusive igneous, sedimentary, or metamorphic rock. These soils have a surface layer that varies in texture and is underlain by bedrock at a depth of 8 to 10 inches.

Rock outcrop consists of exposures of intrusive igneous, sedimentary, or metamorphic rock.

This unit is used for wildlife habitat and watershed.

This map unit is in capability subclass VIIIs(5), nonirrigated.

179—Louie loam, 0 to 2 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and scattered juniper. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray loam about 12 inches thick. The upper 9 inches of the subsoil is yellowish brown loam. The lower 8 inches is yellowish brown sandy clay loam. The next layer is a light yellowish brown, strongly cemented hardpan about 3 inches thick. The underlying material to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones. In some areas the surface layer is sandy loam.

Included in this unit are small areas of a soil that is similar to this Louie soil but has a hardpan at a depth of more than 40 inches. Also included are small areas of Redola loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Louie soil is moderately slow above the impervious hardpan but is rapid below. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated wheat and barley. It is limited mainly by low to moderate available water

capacity and depth to the hardpan. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Irrigation water must be applied carefully to prevent the development of a perched water table.

The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures increase fertility and tilth.

If this unit is used for hay and pasture, the main limitations are low to moderate available water capacity and limited rooting depth. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the sprinkler and border methods.

This unit is suited to use as rangeland. Production of vegetation suitable for livestock grazing is limited by low to moderate available water capacity and restricted rooting depth. Management practices suitable for use on the soil in this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Drought resistant plants are suitable for seeding.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. The main limitation is the depth to the hardpan. The deep cuts needed to provide essentially level building sites can expose the hardpan. The hardpan can be ripped and shattered.

Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If septic tank sewage disposal systems are used, the limitation of moderate depth to the hardpan can be overcome by increasing the size of the absorption field or by placing the tile line below the hardpan.

This map unit is in capability unit IIIs-8(21), irrigated and nonirrigated.

180—Louie loam, 2 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, shrubs, and scattered juniper. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray loam about 12 inches thick. The upper 9 inches of the subsoil is yellowish brown loam. The lower 8 inches is yellowish brown sandy clay loam. The next layer is a light yellowish brown, strongly cemented hardpan about 3 inches thick. The underlying material to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones. In some areas the surface layer is sandy loam.

Included in this unit are small areas of a soil that is similar to this Louie soil but has a hardpan at a depth of more than 40 inches. Also included are small areas of Redola loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Louie soil is moderately slow above the impervious hardpan but is rapid below. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated wheat and barley. It is limited mainly by low to moderate available water capacity, the depth to the hardpan, and slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. If furrow or corrugation irrigation systems are used, runs should be on the contour or across the slope. Irrigation water must be applied carefully to prevent the development of a perched water table.

The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to increase fertility and tilth.

If this unit is used for hay and pasture, the main limitations are low to moderate available water capacity and slope. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the sprinkler method.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by low to moderate available water capacity and restricted rooting depth. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Drought resistant plants are suitable for seeding.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. The main limitations are the depth to the hardpan and slope. The deep cuts needed to provide essentially level building sites can expose the hardpan; however, it can be ripped and shattered. Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

The suitability of the soil in this unit for septic tank absorption fields can be improved by ripping the hardpan to increase permeability.

This map unit is in capability unit IIIe-8(21), irrigated and nonirrigated.

181—Louie stony loam, 0 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered juniper. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray stony loam about 12 inches thick. The upper 9 inches of the subsoil is yellowish brown stony loam. The lower 8 inches is yellowish brown stony sandy clay loam. The next layer is a light yellowish brown, strongly cemented hardpan about 3 inches thick. The underlying material to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones. A few stones are on the surface in some areas.

Included in this unit are small areas of a soil that is similar to this Louie soil but has a hardpan at a depth of more than 40 inches. Also included are small areas of Redola loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Louie soil is moderately slow above the impervious hardpan but is rapid below. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and for homesite development. If the stones on the surface are removed, the unit can be cultivated.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by very low to moderate available water capacity, restricted rooting depth, and stones on the surface. Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management. Use of mechanical treatment practices is not practical, because the surface is stony. Drought resistant plants are suitable for seeding.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, bottlebrush squirreltail, junegrass, and buckbrush.

This unit is suited to homesite development. The main limitations are the depth to the hardpan, stones, and slope. Preserving the existing plant cover during construction helps to control erosion. Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

The suitability of the soil in this unit for septic tank absorption fields can be improved by ripping the hardpan to increase the depth of the more permeable material.

This map unit is in capability subclass VIe(21), nonirrigated.

182—Louie Variant sandy clay loam, 2 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived dominantly from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered juniper. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray and light brownish gray sandy clay loam about 15 inches thick. The subsoil is light brownish gray sandy clay loam about 11 inches thick. The substratum is light gray loam about 7 inches thick. Below this is a light brownish gray, moderately cemented hardpan about 27 inches thick. In a few places the surface layer is silty clay loam.

Included in this unit are small areas of soils that are similar to this Louie Variant soil but have a hardpan at a depth of less than 20 inches or more than 40 inches. Included areas make up about 20 percent of the total acreage.

Permeability of this Louie Variant soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hay and pasture, rangeland, and homesite development.

If this unit is used for hay and pasture, the main limitations are the depth to the hardpan and slope. The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the sprinkler and contour border methods.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by

the low to moderate available water capacity and the restricted rooting depth. Range seeding is a suitable practice if the range vegetation is in poor condition.

The potential plant community on this unit is mainly bottlebrush squirreltail, redstem filaree, Thurber needlegrass, Idaho fescue, and western juniper.

This unit is suited to homesite development. The main limitations are the depth to the hardpan, slow permeability, and slope. Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

The suitability of the soil in this unit for septic tank absorption fields can be improved by ripping the hardpan to increase the depth of the more permeable material so that it can absorb effluent. The limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-3(21), irrigated and nonirrigated.

183—Marpa-Kinkel-Boomer, cool complex, 5 to 15 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 30 percent Marpa gravelly loam, 25 percent Kinkel very gravelly loam, and 20 percent Boomer gravelly loam, cool. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Etsel very gravelly loam that has slopes of 30 to 75 percent, Neuns gravelly loam, Kindig gravelly loam that has slopes of 15 to 50 percent, and a soil that is similar to this Kinkel soil but has bedrock at a depth of 20 to 40 inches. Also included is about 10 percent Rock outcrop. Included areas make up about 25 percent of the total acreage.

The Marpa soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is grayish brown and brown very gravelly loam about 9 inches thick. The subsoil to a depth of 60 inches or more is light yellowish brown, light brown, brown, strong brown, and reddish yellow very gravelly loam.

Permeability of the Kinkel soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Kinkel soil is very deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is grayish brown and brown very gravelly loam about 9 inches thick. The subsoil to a depth of 60 inches or more is light yellowish brown, light brown, brown, strong brown, and reddish yellow very gravelly loam.

Permeability of the Kinkel soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

The Boomer soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown gravelly loam about 10 inches thick. The upper 30 inches of the subsoil is yellowish red gravelly clay loam. The lower 13 inches is yellowish red gravelly sandy clay loam. Weathered rock is at a depth of 53 inches.

Permeability of the Boomer soil is moderately slow. Available water capacity is moderate or high. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine and Douglas-fir. The Marpa soil can produce about 3,693 cubic feet, or 16,610 board feet (Scribner rule), of timber per acre; the Kinkle soil can produce about 2,998 cubic feet, or 13,460 board feet; and the Boomer soil can produce 4,110 cubic feet, or 18,500 board feet. Production is estimated for a fully stocked stand of even-aged ponderosa pine trees 80 years old.

This soil has few limitations for use as woodland. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent this soil produces grazable understory. The understory on the Marpa soil includes needlegrass, western mountainmahogany, tall Oregon-grape, and mountain brome; on the Kinkle soil it includes deerbrush, needlegrass, buckbrush, and common snowberry; and on the Boomer soil it includes bluegrass, mountain brome, blue wildrye, and needlegrass.

This map unit is in capability unit IVe-4(5), nonirrigated.

184—Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 2,500 to 5,000

feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 30 percent Marpa gravelly loam, 25 percent Kinkel very gravelly loam, and 20 percent Boomer gravelly loam, cool. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Rock outcrop and 10 percent Etsel very gravelly loam that has slopes of 30 to 75 percent, Kindig gravelly loam, Neuns gravelly loam, and a soil that is similar to this Kinkel soil but has bedrock at a depth of 20 to 40 inches. Included areas make up about 25 percent of the total acreage.

The Marpa soil is moderately deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is pale brown gravelly loam about 14 inches thick. The subsoil is light yellowish brown very gravelly sandy clay loam about 16 inches thick. Bedrock is at a depth of 30 inches.

Permeability of the Marpa soil is moderate. Available water capacity is very low or low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Kinkel soil is very deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is grayish brown and brown very gravelly loam about 9 inches thick. The subsoil to a depth of 60 inches or more is light yellowish brown, light brown, brown, strong brown, and reddish yellow very gravelly loam.

Permeability of the Kinkel soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

The Boomer soil is deep and well drained. It formed in residuum derived dominantly from metamorphosed rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is brown gravelly loam about 10 inches thick. The upper 30 inches of the subsoil is yellowish red gravelly clay loam. The lower 13 inches is yellowish red gravelly sandy clay loam. Weathered rock is at a depth of 53 inches.

Permeability of the Boomer soil is moderately slow. Available water capacity is moderate or high. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine and Douglas-fir. The Marpa soil can produce about 3,693 cubic feet, or 16,610 board feet (Scribner rule), of timber per acre; the Kinkel soil can produce about 2,998 cubic feet, or 13,460 board feet; and the Boomer soil can produce about 4,110 cubic feet, or 18,500 board feet. Production is estimated for a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, low available water capacity, and plant competition. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. The low available water capacity generally influences seedling survival on the Marpa and Kinkel soils in areas where understory plants are numerous. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, this unit produces grazable understory. The understory on the Marpa soil includes needlegrass, western mountainmahogany, tall Oregon-grape, and mountain brome. On the Kinkel soil it includes deerbrush, needlegrass, buckbrush, and common snowberry. On the Boomer soil it includes bluegrass, mountain brome, blue wildrye, and needlegrass.

This map unit is in capability subclass VIe-(5), nonirrigated.

185—Mary loam, 2 to 9 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown loam about 10 inches thick. The upper 7 inches of the subsoil is dark brown loam. The lower 11 inches is dark yellowish brown clay loam and sandy clay loam. Bedrock is at a depth of 28 inches.

Included in this unit are small areas of Hilt sandy loam, Kuck clay loam, Terwilliger silty clay loam, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Mary soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops and as rangeland.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by depth to rock and slope. Because of slope and the limited soil depth, sprinkler and contour ditch irrigation systems are best suited to the soil in this unit. Waterways should be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. Tilth and fertility can be improved by returning crop residue to the soil.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, Sandberg bluegrass, and buckbrush.

This map unit is in capability unit IIIe-8(21), irrigated and nonirrigated.

186—Mary loam, 9 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown loam about 10 inches thick. The upper 7 inches of the subsoil is dark brown loam. The lower 11 inches is dark yellowish brown clay loam and sandy clay loam. Bedrock is at a depth of 28 inches.

Included in this unit are small areas of Hilt sandy loam, Kuck clay loam, Terwilliger silty clay loam, Rock outcrop, and soils that are similar to this Mary soil but have slopes of as much as 30 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Mary soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops and as rangeland.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion, depth to rock, and slope. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. Returning crop residue to the soil improves tilth and fertility.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit is mainly Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, Sandberg bluegrass, and buckbrush.

This map unit is in capability unit IIIe-8(21), irrigated and nonirrigated.

187—Mary stony loam, 2 to 50 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark brown stony loam about 10 inches thick. The upper 7 inches of the subsoil is dark brown loam. The lower 11 inches is dark yellowish brown clay loam and sandy clay loam. Bedrock is at a depth of 28 inches. A few stones are on the surface in most places.

Included in this unit are small areas of Hilt sandy loam, 15 to 30 percent slopes, Terwilliger silty clay loam, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Mary soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the hazard of erosion, slope, and stones on the surface. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Use of mechanical treatment practices is not practical, because the surface is stony.

Management practices suitable for use on the soil in this unit are proper range use, deferred grazing, and rotation grazing. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, bottlebrush squirreltail, and buckbrush.

This map unit is in capability subclass VIe(21), nonirrigated.

188—Mary-Rock outcrop complex, 2 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Mary stony loam and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Hilt sandy loam, Terwilliger silty clay loam, and soils that are similar to the Mary soil but have slopes of more than 50 percent. Included areas make up about 35 percent of the total acreage.

The Mary soil is moderately deep and well drained. It formed in residuum derived dominantly from extrusive igneous rock. Typically, the surface layer is dark brown stony loam about 10 inches thick. The upper 7 inches of the subsoil is dark brown loam. The lower 11 inches is dark yellowish brown clay loam and sandy clay loam. Bedrock is at a depth of 28 inches. A few stones are on the surface in most places.

Permeability of this Mary soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of exposures of bedrock. It supports no vegetation.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited mainly by the hazard of erosion, slope, stoniness, and areas of Rock outcrop. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Use of mechanical treatment practices is not practical, because the surface is stony.

Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and brush management. Grazing should be delayed until the soil in the unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, bottlebrush squirreltail, and buckbrush.

This map unit is in capability subclass VIIs(21), nonirrigated.

189—Medford clay loam, cool, 0 to 2 percent slopes. This very deep, moderately well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered oak. Elevation is 2,200 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark grayish brown clay loam about 18 inches thick. The upper 23 inches of the subsoil is dark brown and yellowish brown clay. The lower 8 inches is yellowish brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown clay loam.

Included in this unit are small areas of Dotta loam, Jenny clay, and a soil that is similar to this Medford soil but is moderately alkaline and calcareous throughout. Included areas make up about 20 percent of the total acreage.

Permeability of this Medford soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It has few limitations. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the unit. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. Leveling is needed in sloping areas for the efficient application and removal of irrigation water. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures increase fertility and tilth.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, and western juniper.

This unit is suited to homesite development. The main limitations are load supporting capacity, the potential for shrinking and swelling, and moderately slow permeability. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

If septic tank absorption fields are used, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

This map unit is in capability subclasses IIc(21), irrigated, and IIIc(21), nonirrigated.

190—Medford clay loam, cool, 2 to 5 percent slopes. This very deep, moderately well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered oak. Elevation is 2,200 to 4,000 feet. The average annual precipitation is about 18 inches, the average

annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark grayish brown clay loam about 18 inches thick. The upper 23 inches of the subsoil is dark brown and yellowish brown clay. The lower 8 inches is yellowish brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown clay loam.

Included in this unit are small areas of Dotta loam, Jenny clay, and a soil that is similar to this Medford soil but is moderately alkaline and calcareous throughout. Included areas make up about 20 percent of the total acreage.

Permeability of this Medford soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It has few limitations. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the unit. The method used generally is governed by the crop grown. If furrow or corrugation irrigation systems are used, runs should be on the contour or across the slope. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. Water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures increase fertility and tilth.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, and western juniper.

This unit is suited to homesite development. The main limitations are load supporting capacity, the potential for shrinking and swelling, and moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in the unit to support a load. If buildings are constructed on the soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

If septic tank absorption fields are used, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIe-1(21), irrigated, and IIIe-1(21), nonirrigated.

191—Medford clay loam, cool, 5 to 15 percent slopes. This very deep, moderately well drained, rolling soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, shrubs, and scattered oak. Elevation is 2,200 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark grayish brown clay loam about 18 inches thick. The upper 23 inches of the subsoil is dark brown and yellowish brown clay. The lower 8 inches is yellowish brown clay loam. The substratum to a depth of 60 inches or more is yellowish brown clay loam.

Included in this unit are small areas of Dotta loam, Jenny clay, and a soil that is similar to this Medford soil but is moderately alkaline and calcareous throughout. Included areas make up about 20 percent of the total acreage.

Permeability of this Medford soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slope. Sprinkler or contour ditch irrigation is suited to the soil in the unit. The method used generally is governed by the crop grown. Pipe, ditch lining, or drop structures should be installed in irrigation ditches to facilitate irrigation and prevent excessive ditch erosion. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. All tillage should be on the contour or across the slope.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If the shrubs are managed to create open areas, the soil produces a good stand of desirable grasses and forbs.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, and western juniper.

This unit is suited to homesite development. The main limitations are load supporting capacity, the potential for shrinking and swelling, moderately slow permeability, and slope. Only the part of the site that is used for construction should be disturbed.

Plans for homesite development should provide for the preservation of as many trees as possible. Establishing and maintaining plant cover can be achieved through proper fertilizing, seeding, mulching, and shaping of the slopes.

If septic tank absorption fields are used, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. The steepness of slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability unit IIIe-1(21), irrigated and nonirrigated.

192—Montague clay, 0 to 2 percent slopes. This moderately deep, well drained soil is on terraces. It formed in alluvium derived from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 3,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray and brown clay about 24 inches thick. The next layer is a strongly cemented hardpan about 12 inches thick. Weathered rock is at a depth of 36 inches.

Included in this unit are small areas of Lassen clay, Kuck clay loam, Medford clay loam, Montague Variant clay, soils that are covered by stones, and Rock outcrop, all of which have slopes of as much as 9 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Montague soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches and is limited by the hardpan. The depth to bedrock is 30 to 48 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and urban development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slow permeability and depth to the hardpan. Tillage should be performed when the moisture content is about 50 percent of field capacity. Tilth and fertility can be improved by returning crop residue to the soil. Tillage should be kept to a minimum.

Furrow, border, and corrugation irrigation systems are suited to the soil in this unit. Because of the slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface.

This unit is suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the border and corrugation methods.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the potential for shrinking and swelling. Plants that tolerate high shrink-swell potential should be seeded. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and sulphurflower.

This unit is suited to urban development. The main limitations are the depth to the hardpan and bedrock, the potential for shrinking and swelling, load supporting capacity, and slow permeability. The hardpan is rippable and therefore is not a serious limitation for most engineering uses; however, the bedrock underlying the hardpan is a continuing problem.

If the soil in this unit is used for septic tank absorption fields, the limitations of moderate depth to rock and slow permeability can be partially overcome by increasing the size of the absorption field.

Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If buildings are constructed on the soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

This map unit is in capability unit IIIs-5(21), irrigated and nonirrigated.

193—Montague clay, 2 to 9 percent slopes. This moderately deep, well drained soil is on terraces. It formed in alluvium derived from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 3,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray and brown clay about 24 inches thick. The next layer is a strongly cemented hardpan about 12 inches thick. Weathered rock is at a depth of 36 inches. Depth to bedrock ranges from 30 to 40 inches.

Included in this unit are small areas of Lassen clay, Kuck clay loam, Medford clay loam, Montague Variant clay, soils that are covered with stones, and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Montague soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and urban development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slow permeability, the depth to the hardpan and bedrock, and the hazard of erosion. Furrow, border, corrugation, and contour ditch irrigation systems are suited to the soil in this unit. Because of the slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion. Also, waterways should be shaped and seeded to perennial grass.

Tilth and fertility can be improved by returning crop residue to the soil. Tillage should be performed when the moisture content is about 50 percent of field capacity. It should be kept to a minimum.

This unit is suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the border and contour ditch methods.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the potential for shrinking and swelling. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate high shrink-swell potential should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, beardless wheatgrass, Idaho fescue, and sulphurflower.

This unit is suited to urban development. The main limitations are slow permeability, the potential for shrinking and swelling, depth to the hardpan and bedrock, and load supporting capacity.

The suitability of the soil in this unit for septic tank absorption fields is limited by the moderate depth to the hardpan and bedrock and by slow permeability. These limitations can be overcome by increasing the size of the filter field.

Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If buildings are constructed, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

194—Montague cobbly clay, 0 to 9 percent slopes. This moderately deep, well drained soil is on terraces. It formed in alluvium derived from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 3,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray and brown cobbly clay about 24 inches thick. The next layer is a strongly cemented hardpan about 12 inches thick. Weathered rock is at a depth of 36 inches. Depth to rock ranges from 30 to 48 inches. A few cobbles are on the surface in most places.

Included in this unit are small areas of Lassen clay, Kuck clay loam, Medford clay loam, Montague Variant clay, soils that are covered with stones, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Montague soil is slow. Available water capacity is very low to low. Effective rooting depth to the hardpan is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is poorly suited to irrigated hay and pasture. The main limitations are cobbles on the surface and slow permeability.

Irrigation water can be applied by the border and contour ditch methods. Because of the slow permeability of the soil in this unit, the application of irrigation water should be regulated so that water does not stand on the surface.

Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. The use of equipment is limited by cobbles on the surface.

This unit is suited to use as rangeland. The main limitations are cobbles on the surface, slow permeability, and the potential for shrinking and swelling. The soil in this unit responds well to fertilizer and to proper grazing

use. Plants that tolerate a high shrink-swell potential should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. Use of mechanical treatment practices is not practical, because the surface is cobbly.

The potential plant community on this unit is mainly beardless wheatgrass, bluebunch wheatgrass, bottlebrush squirreltail, and Idaho fescue.

This unit is suited to urban development. The main limitations are slow permeability, the potential for shrinking and swelling, depth to the hardpan and bedrock, load supporting capacity, and cobbles on the surface.

The suitability of the soil in this unit for septic tank absorption fields is limited by the depth to the hardpan and bedrock and slow permeability. These limitations can be overcome by increasing the size of the absorption field.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If buildings are constructed on the soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

This map unit is in capability unit IVe-7(21), irrigated and nonirrigated.

195—Montague Variant clay, 0 to 9 percent slopes. This shallow, well drained soil is on terraces. It formed in alluvium derived from extrusive igneous rock. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 3,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is grayish brown clay about 12 inches thick. The next layer is a very strongly lime cemented hardpan about 3 inches thick. Weathered rock is at a depth of 15 inches. Depth to rock ranges from 15 to 44 inches.

Included in this unit are small areas of Lassen clay, Kuck clay loam, Medford clay loam, Montague clay, and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Montague Variant soil is slow. Available water capacity is very low to low. Effective rooting depth to the hardpan is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hay and pasture, rangeland, and homesite development.

This unit is suited to hay and pasture. The main limitations are slow permeability and the depth to the hardpan.

Irrigation water can be applied by the border and contour ditch methods. Because of the slow permeability of the soil in this unit, the application of water should be regulated so that the water does not stand on the surface.

Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the potential for shrinking and swelling, susceptibility of the soil to compaction, and shallow depth to rock. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate shrinking and swelling should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, bluebunch wheatgrass, and big sagebrush.

This unit is suited to urban development. The main limitations are slow permeability, the potential for shrinking and swelling, depth to the hardpan and bedrock, and load supporting capacity. The suitability of the soil for septic tank absorption fields is limited by the depth to the hardpan and bedrock and slow permeability. These limitations can be overcome by increasing the size of the filter field.

Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If buildings are constructed on the soil, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit VIe-5(21), irrigated and nonirrigated.

196—Neer-Ponto stony sandy loams, 15 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly mixed conifers and brush. Elevation is 2,700 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 45 percent Neer stony sandy loam and 35 percent Ponto stony sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Ponto soil but is very gravelly throughout, soils that are covered with stones, Rock outcrop, and

soils that are similar to the Neer and Ponto soils but have slopes of more than 50 percent. Included areas make up about 20 percent of the total acreage.

The Neer soil is moderately deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and yellowish brown stony sandy loam about 9 inches thick. The subsoil is light yellowish brown very gravelly sandy loam about 17 inches thick. Extrusive igneous rock is at a depth of 26 inches.

Permeability of this Neer soil is rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Ponto soil is very deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown and brown stony sandy loam about 8 inches thick. The subsoil is light brown, pink, and very pale brown sandy loam about 45 inches thick. The substratum to a depth of 80 inches or more is light brown stony sandy loam. A few stones are on the surface in most places.

Permeability of the Ponto soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

The Neer soil is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,998 cubic feet, or 13,460 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, plant competition, and seedling mortality. Conventional methods of harvesting trees can be used, but stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, plant competition can prevent or prolong natural or artificial reestablishment of trees. The very low to low available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are Douglas-fir and white fir.

When the density of the forest canopy is less than about 40 percent, the Neer soil produces grazable understory. The understory includes manzanita, snowbrush ceanothus, serviceberry, needlegrass, and sierra chinquapin. Livestock grazing should be managed to protect the soil from excessive erosion.

The Ponto soil is suited to the production of ponderosa pine, Douglas-fir, and incense-cedar. It can produce about 7,880 cubic feet, or 37,110 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and plant competition. Conventional methods of harvesting trees can be used, but stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, plant competition can prevent or prolong natural or artificial reestablishment of trees. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, the Ponto soil produces grazable understory. The understory includes manzanita, whitethorn ceanothus, bitter cherry, and snowbrush ceanothus. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIe(22), nonirrigated.

197—Neer-Ponto complex, 15 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly mixed conifers and brush. Elevation is 2,700 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 50 percent Neer gravelly sandy loam and 35 percent Ponto sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Ponto soil but is very gravelly throughout, Rock outcrop, and soils that have slopes of more than 50 percent. Included areas make up about 15 percent of the total acreage.

The Neer soil is moderately deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris

about 2 inches thick. The surface layer is dark brown and yellowish brown gravelly sandy loam about 9 inches thick. The subsoil is light yellowish brown very gravelly sandy loam about 17 inches thick. Extrusive igneous rock is at a depth of 26 inches.

Permeability of this Neer soil is rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Ponto soil is very deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown and brown sandy loam about 8 inches thick. The subsoil is light brown, pink, and very pale brown sandy loam about 45 inches thick. The substratum to a depth of 80 inches or more is light brown stony sandy loam.

Permeability of the Ponto soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

The Neer soil is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,998 cubic feet, or 13,460 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and plant competition. Conventional methods of harvesting trees can be used. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from such plants can prevent or prolong natural or artificial reestablishment of trees. The very low to low available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are Douglas-fir and white fir.

When the density of the forest canopy is less than about 40 percent, the Neer soil produces grazable understory. The understory includes manzanita, needlegrass, antelope bitterbrush, and serviceberry. Livestock grazing should be managed to protect the soil from excessive erosion.

The Ponto soil is suited to the production of ponderosa pine, Douglas-fir, and incense-cedar. It can produce about 7,880 cubic feet, or 37,110 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and plant competition. Conventional methods of harvesting trees can be used. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Reforestation must be carefully managed to reduce competition from undesirable understory plants. If site preparation is not adequate, competition from such plants can prevent or prolong natural or artificial reestablishment of trees. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, the Ponto soil produces grazable understory. The understory includes manzanita, sierra chinquapin, whitethorn ceanothus, and bitter cherry. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIe(22), nonirrigated.

198—Odas sandy loam. This very deep, poorly drained soil is on flood plains. It formed in alluvium derived dominantly from extrusive igneous rock. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown sandy loam about 31 inches thick. The upper 10 inches of the underlying material is grayish brown sandy loam. The lower part to a depth of 60 inches or more is light brownish gray and gray sandy loam.

Included in this unit are small areas of Settlemeyer loam, Diyou loam, and a soil that is similar to this Odas soil but has a water table at a depth of 36 to 60 inches in summer. Included areas make up about 15 percent of the total acreage.

Permeability of this Odas soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A water table is at a depth of 18 to 36 inches throughout the year. This soil is subject to rare periods of flooding.

This unit is used for dryland hay and pasture, rangeland, and homesite development.

This unit is suited to dryland hay and pasture. The main limitation is wetness. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in

compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by wetness. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes carex, redtop, tufted hairgrass, and bluegrass.

This unit is poorly suited to homesite development. The main limitations are the high water table and the hazard of flooding. Septic tank absorption fields do not function properly because of the high water table. Flooding can be controlled only by use of major flood control structures. Landscaping plants that tolerate a high water table should be selected if drainage is not provided.

This map unit is in capability unit IIIw-2(21), nonirrigated.

199—Oosen loamy sand, 2 to 15 percent slopes. This very deep, somewhat excessively drained soil is on mountains. It formed in volcanic ash. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 5,000 to 7,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/4 inch thick. The surface layer is dark brown and light yellowish brown loamy sand about 12 inches thick. The upper 16 inches of the underlying material is yellowish brown loamy sand. The lower part to a depth of 72 inches is dark brown sand.

Included in this unit are small areas of Avis soils, Iller stony sandy loam, a Sheld very stony sandy loam that has slopes of 50 to 65 percent, Rock outcrop, and soils that are similar to this Oosen soil but have slopes of more than 15 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Oosen soil is rapid. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, white fir, and Douglas-fir. It can produce about 6,248 cubic feet, or 29,280 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Reforestation must be carefully managed to reduce competition from such plants. The low to moderate available water capacity generally influences seedling survival in areas where understory plants are numerous. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting are white fir and California red fir.

The understory includes sierra chinquapin and greenleaf manzanita.

This map unit is in capability subclass VIe(22), nonirrigated.

200—Orset sandy loam, 0 to 9 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed conifers, perennial grasses, forbs, and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is 65 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1/2 inch thick. The surface layer is grayish brown and pale brown sandy loam about 13 inches thick. The underlying material to a depth of 60 inches or more is very pale brown loam. Below a depth of about 42 inches the underlying material is weakly to moderately cemented by silica.

Included in this unit are small areas of an Avis stony sandy loam that has slopes of 0 to 5 percent, an Iller stony sandy loam that has slopes of 0 to 9 percent, Rock outcrop, and soils that have slopes of more than 9 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Orset soil is moderately slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,720 cubic feet, or 12,200 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Reforestation must be carefully managed to reduce competition from such plants. Proper site preparation controls initial plant competition, and spraying controls subsequent growth.

Among the trees that are suitable for planting are Douglas-fir and ponderosa pine.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory vegetation. The understory vegetation includes bottlebrush squirreltail, needlegrass, and antelope bitterbrush.

This map unit is in capability unit IVe-1(22), nonirrigated.

201—Pinehurst stony loam, 2 to 15 percent slopes. This deep, well drained soil is on mountains. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed conifers, shrubs, and forbs. Elevation is 4,000 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark brown stony loam about 10 inches thick. The upper 38 inches of the subsoil is reddish brown gravelly loam and dark brown gravelly clay loam. The lower 12 inches is dark brown very stony clay loam. Weathered bedrock is at a depth of 60 inches. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Pinehurst soil but is underlain by extrusive igneous rock at a depth of 10 to 20 inches, Plutos loamy sand, Rock outcrop, and soils that have slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Pinehurst soil is moderately slow. Available water capacity is low. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of Douglas-fir, ponderosa pine, and white fir. It can produce about 3,415 cubic feet, or 15,350 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concern in producing and harvesting timber is plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Among the trees that are suitable for planting are Douglas-fir, ponderosa pine, and white fir.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes deerbrush, snowbrush ceanothus, snowberry, and Idaho fescue.

This map unit is in capability unit IVe-7(22), nonirrigated.

202—Pinehurst stony loam, 15 to 30 percent slopes. This deep, well drained soil is on mountains. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed conifers, shrubs, and forbs. Elevation is 4,000 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark brown stony loam about 10 inches thick. The upper 38 inches of the subsoil is reddish brown gravelly loam and dark brown gravelly clay loam. The lower 12 inches is dark brown very stony clay loam. Unweathered bedrock is at a depth of 60 inches or more. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Pinehurst soil but is underlain by extrusive igneous rock at a depth of 10 to 20 inches, Plutos loamy sand, and soils that have slopes of more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Pinehurst soil is moderately slow. Available water capacity is low to high. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is moderately suited to the production of Douglas-fir, ponderosa pine, and white fir. It can produce about 3,415 cubic feet, or 15,350 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting are Douglas-fir, ponderosa pine, and white fir.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes deerbrush, snowbrush ceanothus, snowberry, and Idaho fescue.

This map unit is in capability unit IVe-7(22), nonirrigated.

203—Pinehurst stony loam, 30 to 50 percent slopes. This deep, well drained soil is on mountains. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed conifers, shrubs, and forbs. Elevation is 4,000 to 6,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark brown stony loam about 10 inches thick. The upper 38 inches of the subsoil is reddish brown and dark brown gravelly loam and gravelly clay loam. The lower 12 inches is dark brown clay loam. Weathered bedrock is at a depth of 60 inches. A few stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Pinehurst soil but is underlain by extrusive igneous rock at a depth of 10 to 40 inches, Rock outcrop, and soils that have slopes of more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Pinehurst soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of Douglas-fir, ponderosa pine, and white fir. It can produce about 3,415 cubic feet, or 15,350 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged Douglas-fir trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and plant competition. Conventional methods of harvesting trees can be used. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Among the trees that are suitable for planting are Douglas-fir, ponderosa pine, and white fir.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes deerbrush, snowbrush ceanothus, snowberry, and Idaho fescue. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIe(22), nonirrigated.

204—Pinehurst Variant very stony loam, 0 to 15 percent slopes. This moderately deep, well drained soil is on mountains. It formed in residuum derived dominantly from andesite. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 4,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface layer is dark brown and dark reddish brown very stony loam about 12 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 14 inches thick. Weathered rock is at a depth of 26 inches. Many stones are on the surface in most places.

Included in this unit are small areas of Kuck clay loam, Lassen clay, Rock outcrop, and a soil that is similar to this Pinehurst Variant soil but has slopes of 15 to 30 percent. Included areas make up about 30 percent of the total acreage.

Permeability of this Pinehurst Variant soil is moderately slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

This unit is suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,292 cubic feet, or 10,120 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are stoniness and seedling mortality. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes deerbrush, fescue, and bluegrass. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIs(22), nonirrigated.

205—Pinehurst Variant very stony loam, 15 to 65 percent slopes. This moderately deep, well drained soil is on mountains. It formed in residuum derived

dominantly from andesite. The native vegetation is mainly mixed conifers, shrubs, perennial grasses, and forbs. Elevation is 3,000 to 4,000 feet. The average annual precipitation is about 30 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is about 90 days.

Typically, the surface layer is dark brown and dark reddish brown very stony loam about 12 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 14 inches thick. Weathered rock is at a depth of 26 inches. Many stones are on the surface in most places.

Included in this unit are small areas of Kuck clay loam, 0 to 15 percent slopes; Lassen clay, 9 to 15 percent slopes; and Rock outcrop. Included areas make up about 20 percent of the total acreage.

Permeability of this Pinehurst Variant soil is moderately slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

This unit is used as woodland and for livestock grazing.

This unit is poorly suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,292 cubic feet, or 10,120 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, and seedling mortality. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, the soil in this unit produces grazable understory. The understory includes deerbrush, fescue, and bluegrass. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability subclass VIIs(22), nonirrigated.

206—Pit clay. This very deep, poorly drained soil is on flood plains. It formed in alluvium derived dominantly from extrusive igneous rock. Slope is 0 to 2 percent. The vegetation in areas not cultivated is mainly perennial grasses and forbs. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark gray clay about 38 inches thick. The underlying material to a depth of 61 inches or more is pale brown clay loam. In some areas the surface layer is silty clay.

Included in this unit is about 20 percent soils that are similar to this Pit clay but have a dark brown or dark grayish brown clay surface layer and are calcareous throughout. Also included is about 15 percent Lassen clay and Montague clay that have slopes of 2 to 5 percent. Included areas make up about 35 percent of the total acreage.

Permeability of this Pit soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 24 to 36 inches from December through May. This soil is subject to long periods of flooding from December through March.

This unit is used for cultivated crops, hay and pasture, and rangeland.

This unit is suited to irrigated and nonirrigated wheat. It is limited mainly by the clayey soil texture, the seasonal high water table, slow permeability, and the hazard of flooding. Tillage should be performed when the moisture content is about 50 percent of field capacity. Tile drainage can be used to lower the water table if a suitable outlet is available.

Furrow, border, and corrugation irrigation systems are suited to the soil in this unit. Because of the slow permeability of the soil, the application of water should be regulated so that water does not stand on the surface and damage the crops.

Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Tillage should be kept to a minimum.

This unit is suited to hay and pasture. The main limitations are wetness and the hazard of flooding. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by wetness. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes tufted hairgrass, carex, bluegrasses, and Baltic rush.

This map unit is in capability unit IIIw-5(21), irrigated and nonirrigated.

207—Plutos-Rock outcrop complex, 0 to 30 percent slopes. This map unit is on glacial fans and hills. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,800 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 55 percent Plutos loamy sand and 35 percent Rock outcrop. The Plutos soil is in nearly level to moderately sloping areas on glacial fans, and Rock outcrop is in moderately steep areas on hills. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Delaney sand that has slopes of less than 9 percent, Delaney Variant silt that has slopes of less than 2 percent, a soil that is similar to the Plutos soil but is underlain by bedrock at a depth of 10 to 20 inches, and a soil that is similar to the Plutos soil but has slopes of more than 30 percent. Included areas make up about 10 percent of the total acreage.

The Plutos soil is moderately deep and somewhat excessively drained. It formed in glaciofluvial deposits derived dominantly from extrusive igneous rock and volcanic ash. Typically, the surface layer is grayish brown loamy sand about 7 inches thick. The underlying material is light brownish gray and pale brown sand about 16 inches thick. Fractured bedrock is at a depth of 23 inches.

Permeability of the Plutos soil is rapid. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high. The hazard of soil blowing is moderate.

Rock outcrop consists of exposures of basalt. It supports only a few scattered perennial grasses, which grow in fractures in the rock.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by droughtiness, the hazards of water erosion and soil blowing, and the areas of Rock outcrop. Livestock grazing should be managed to protect the soil in this unit from excessive erosion. Management practices suitable for use on the soil are proper range use, deferred grazing, and rotation grazing.

The potential plant community on this unit includes western juniper, antelope bitterbrush, manzanita, and big sagebrush.

This map unit is in capability subclass VIIe(21), nonirrigated.

208—Ponto sandy loam, 5 to 15 percent slopes. This very deep, well drained soil is on hills. It formed in volcanic ash. The native vegetation is mainly conifers and brush. Elevation is 2,700 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is very dark grayish brown and brown sandy loam about 8 inches thick. The subsoil is light brown, pink, and very pale brown sandy loam about 45 inches thick. The substratum to a depth of 80 inches is light brown stony sandy loam.

Included in this unit are small areas of a soil that is similar to this Ponto soil but is very gravelly throughout, Rock outcrop, and soils that have slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Ponto soil is moderate. Available water capacity is moderate or high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, Douglas-fir, and incense-cedar. It can produce about 7,880 cubic feet, or 37,110 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concern in producing and harvesting timber is plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

The understory includes manzanita, whitethorn ceanothus, and bitter cherry.

This map unit is in capability unit IIIe-1(22), nonirrigated.

209—Ponto-Neer complex, 2 to 15 percent slopes. This map unit is on hills. The native vegetation is mainly conifers and brush. Elevation is 2,700 to 5,000 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Ponto sandy loam and 30 percent Neer gravelly sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to the Ponto soil but is very gravelly throughout, soils that are covered by stones, Rock outcrop, and soils

that have slopes of more than 15 percent. Included areas make up about 30 percent of the total acreage.

The Ponto soil is very deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. Typically, the surface layer is very dark grayish brown and brown sandy loam about 8 inches thick. The subsoil is light brown, pink, and very pale brown sandy loam about 45 inches thick. The substratum to a depth of 80 inches is light brown stony sandy loam.

Permeability of the Ponto soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

The Neer soil is moderately deep and well drained. It formed in volcanic ash. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and yellowish brown gravelly sandy loam about 9 inches thick. The subsoil is light yellowish brown very gravelly sandy loam about 17 inches thick. Extrusive igneous rock is at a depth of 26 inches.

Permeability of the Neer soil is rapid. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as woodland and for livestock grazing.

The Ponto soil is well suited to the production of ponderosa pine, Douglas-fir, and incense-cedar. It can produce about 7,880 cubic feet, or 37,110 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concern in producing and harvesting timber is plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Among the trees that are suitable for planting are ponderosa pine and Douglas-fir.

When the density of the forest canopy is less than about 40 percent, the Ponto soil produces grazable understory. The understory is mainly manzanita, sierra chinquapin, and whitethorn ceanothus. Livestock grazing should be managed to protect the soil from excessive erosion.

The Neer soil is moderately suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,998 cubic feet, or 13,460 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are plant competition and seedling mortality. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The very low or low available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting are Douglas-fir and white fir.

When the density of the forest canopy is less than about 40 percent, the Neer soil produces grazable understory. The understory includes manzanita, sierra chinquapin, serviceberry, and needlegrass. Livestock grazing should be managed to protect the soil from excessive erosion.

This map unit is in capability unit IVe-1(22), nonirrigated.

210—Redola loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 13 inches thick. The next layer is dark brown clay loam about 6 inches thick. The upper 20 inches of the underlying material is brown sandy loam and pale brown loam. The lower part to a depth of 60 inches or more is gray gravelly sand.

Included in this unit are small areas of a soil that is similar to this Redola soil but contains slight to moderate concentrations of salt and is strongly alkaline. Also included are small areas of Delaney sand, Delaney Variant soils, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Redola soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It has few limitations. In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion.

Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Irrigation water can be applied by the sprinkler and border methods.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. The plants selected for seeding should meet the seasonal requirements of livestock or wildlife, or both.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, and redstem filaree.

This unit is suited to homesite development. The main limitation is the moderate permeability. Onsite investigation is needed to properly determine the correct placement of filter lines for septic tank sewage disposal systems. Plans for homesite development should provide for the preservation of as many trees as possible. Mulching, fertilizing, and irrigating help to establish lawn grasses and other small seeded plants.

This map unit is in capability subclasses IIc(21), irrigated, and IIIc(21), nonirrigated.

211—Redola loam, 2 to 9 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is dark grayish brown loam about 13 inches thick. The next layer is dark brown clay loam about 6 inches thick. The upper 20 inches of the underlying material is brown sandy loam and pale brown loam. The lower part to a depth of 60 inches or more is gray gravelly sand.

Included in this unit are small areas of a soil that is similar to this Redola soil but contains slight to moderate concentrations of salt and is strongly alkaline. Also included are small areas of Delaney sand, Delaney Variant soils, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Redola soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop grown. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion. Leveling is needed in sloping areas for the efficient application and removal of irrigation water.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Irrigation water can be applied by the sprinkler and border methods. Seedbed preparation should be on the contour or across the slope where practical.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. The plants selected for seeding should meet the seasonal requirements of livestock or wildlife, or both.

The potential plant community on this unit includes bottlebrush squirreltail, Thurber needlegrass, and redstem filaree.

This unit is suited to homesite development. The main limitation is the moderate permeability. Onsite investigation is needed to properly determine the correct placement of filter lines for septic tank sewage disposal systems. Preserving the existing plant cover during construction helps to control erosion. Plans for homesite development should provide for the preservation of as many trees as possible. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability units IIe-1(21), irrigated, and IIIe-1(21), nonirrigated.

212—Riverwash. This map unit is on the flood plains of major rivers throughout the survey area. It is flooded almost every year. It consists of unstabilized and stratified sandy, silty, clayey, stony, cobbly, and gravelly sediment that is reworked by water about every year. It supports little or no vegetation. Slope is 0 to 5 percent. Drainage is excessive. Areas of this unit are subject to deposition when flooding occurs.

Included in this unit are small areas of Diyou loam, Rock outcrop, and soils that are covered with stones

and boulders. Included areas make up about 25 percent of the mapped acreage.

This unit is used for wildlife habitat and watershed. A few areas are mined for sand and gravel.

This map unit is in capability subclass VIIIw(21), nonirrigated.

213—Rock outcrop-Dubakella complex, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers, shrubs, forbs, and perennial grasses. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 50 percent Rock outcrop and 30 percent Dubakella stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ipish soils that have a very gravelly loam surface layer, Weitchpec Variant gravelly loam, a soil that is similar to the Dubakella soil but is gravelly clay throughout, and soils that have slopes of more than 50 percent. Included areas make up about 20 percent of the total acreage.

Rock outcrop consists of exposures of bedrock. It does not support vegetation.

The Dubakella soil is moderately deep and well drained. It formed in residuum derived dominantly from serpentine. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is pale brown stony loam about 11 inches thick. The subsoil is brown very gravelly clay about 25 inches thick. Bedrock is at a depth of 36 inches. A few stones are on the surface in most places.

Permeability of the Dubakella soil is slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used for wildlife habitat and watershed.

This map unit is in capability subclass VIIIs(5), nonirrigated.

214—Rock outcrop-Louie complex, 0 to 15 percent slopes. This map unit is on terraces (fig. 2). The native vegetation is mainly mixed oak and juniper woodland with associated shrubs and grasses. Elevation is 2,500 to 3,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 45 percent Rock outcrop and 35 percent Louie stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Delaney sandy loam that has slopes of 0 to 5 percent, Medford clay loam, soils that are covered with stones and boulders, and a soil that is similar to the Louie soil but has slopes of more than 15 percent. Included areas make up about 20 percent of the total acreage.

Rock outcrop consists of exposures of bedrock. It does not support vegetation.

The Louie soil is moderately deep to a hardpan and is well drained. It formed in alluvium derived dominantly from extrusive igneous rock. Typically, the surface layer is light brownish gray stony loam about 6 inches thick. The next layer is light brownish gray cobbly loam about 6 inches thick. The upper 9 inches of the subsoil is yellowish brown cobbly loam. The lower 8 inches is yellowish brown cobbly sandy clay loam. The next layer is a light yellowish brown, strongly cemented hardpan about 3 inches thick. The underlying material to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones. A few stones are on the surface in most places.

Permeability of the Louie soil is moderately slow above the impervious hardpan and rapid below it. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the many areas of Rock outcrop. Management practices suitable for use on the unit are proper range use and deferred grazing. Trails can be constructed in places to encourage livestock grazing in areas where access is limited.

The potential plant community on the Louie soil includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This map unit is in capability subclass VIIs(21), nonirrigated.

215—Rock outcrop-Terwilliger complex, 2 to 50 percent slopes. This map unit is on hills. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 2,200 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Rock outcrop and 30 percent Terwilliger stony silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to this Terwilliger soil but is underlain by bedrock at a depth of 10 to 20 inches, Hilt stony sandy loam, Mary stony loam, and a soil that is similar to this Terwilliger soil but has slopes of more than 50 percent. Included areas make up about 30 percent of the total acreage.

Figure 2—Area of Rock outcrop-Louie complex, 0 to 15 percent slopes. This soil provides important habitat for upland wildlife and waterfowl.

Rock outcrop consists of exposures of bedrock. It does not support vegetation.

The Terwilliger soil is moderately deep and well drained. It formed in residuum derived dominantly from siltstone. Typically, the surface layer is light brownish gray stony silty clay loam about 6 inches thick. The upper 13 inches of the subsoil is pale brown and light olive brown silty clay loam. The lower 15 inches is light yellowish brown silty clay and olive gravelly silty clay. Weathered rock is at a depth of 34 inches. A few stones are on the surface in most places.

Permeability of the Terwilliger soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the many areas of Rock outcrop and slope. Rock outcrop and steepness of slope limit access by livestock and promote overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

The potential plant community on the Terwilliger soil includes Idaho fescue, Oregon white oak, rabbitbrush, and western juniper.

This map unit is in capability subclass VIIs(21), nonirrigated.

216—Rock outcrop. This map unit consists of exposures of limestone and igneous bedrock. Large areas of limestone Rock outcrop are northwest of Gazelle, and areas of igneous Rock outcrop are throughout the survey area. Slope is 9 to 50 percent. Drainage is excessive, and runoff is very rapid. Because of the very rapid runoff from the rock, the hazard of erosion on the small areas of included soils is very high.

Included in this unit are small areas of shallow and very shallow soils that vary in texture, Mary loam, Jilson gravelly loam, Terwilliger loam, sedimentary rock, serpentine, and soils that have slopes of 50 to 80 percent. Included areas make up about 15 percent of the mapped acreage.

This unit is used for wildlife habitat and watershed. A few areas are also used for quarrying limestone.

This map unit is in capability subclass VIIIs(5,21,22), nonirrigated.

217—Salisbury clay loam, 0 to 2 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray clay loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown clay loam. The lower 16 inches is dark grayish brown and dark brown clay. The next layer is a strongly cemented hardpan about 8 inches thick. Below this to a depth of 60 inches or more is stratified sand, gravel, and some stones.

Included in this unit are small areas of a Kuck clay loam, Lassen clay, and Mary loam that have slopes of 0 to 2 percent. Also included are a few areas of Medford clay loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Salisbury soil is slow above the impervious hardpan and rapid below it. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by depth to hardpan. The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. In areas where the hardpan has not been ripped, irrigation water must be applied carefully to prevent the development of a perched water table. Drainage may also be required.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Irrigation water can be applied by the sprinkler and border methods.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Idaho fescue, bluebunch wheatgrass, and sagebrush.

If this unit is used for homesite development, the main limitations are the depth to the hardpan, low load supporting capacity, the potential for shrinking and swelling, and slow permeability. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

The suitability of the soil for septic tank absorption fields can be improved by ripping the hardpan to increase permeability. The limitation of slow permeability can also be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIs-3(21), irrigated and nonirrigated.

218—Salisbury clay loam, 2 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray clay loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown clay loam. The lower 16 inches is dark grayish brown and dark brown clay. The next layer is a strongly cemented hardpan about 8 inches thick. Below this to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones.

Included in this unit are small areas of Kuck clay loam, Lassen clay, Mary loam, and Medford clay loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Salisbury soil is slow above the impervious hardpan and rapid below it. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the depth to the hardpan. The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. In areas where the hardpan has not been ripped, irrigation water must be applied carefully to prevent the development of a perched water table. Drainage may also be required.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Diversions and grassed waterways may be needed. All tillage should be on the contour or across the slope.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Irrigation water can be applied by the border and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Idaho fescue, bluebunch wheatgrass, and sagebrush.

If this unit is used for homesite development, the main limitations are depth to rock, low load supporting capacity, the potential for shrinking and swelling, and slow permeability. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

The suitability of the soil for septic tank absorption fields can be improved by ripping the hardpan to increase permeability. The limitation of slow permeability can also be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-3(21), irrigated and nonirrigated.

219—Salisbury gravelly clay loam, 0 to 5 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray gravelly clay loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown gravelly clay loam. The lower 16 inches is dark grayish brown and dark brown gravelly clay. The next layer is a strongly cemented hardpan about 8 inches thick. Below this to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones.

Included in this unit are small areas of a Kuck clay loam that has slopes of 0 to 9 percent, a Lassen clay that has slopes of 0 to 9 percent, Mary loam, and Medford clay loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Salisbury soil is slow above the impervious hardpan and rapid below it. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the depth to the hardpan and gravel in the surface layer. The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. In areas where the hardpan has not been ripped, irrigation water must be applied carefully to prevent the development of a perched water table. Drainage may also be required.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Gravel in the surface layer causes rapid wear of equipment used for tillage.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Irrigation water can be applied by the border and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, Douglas rabbitbrush, sagebrush, and Idaho fescue.

If this unit is used for homesite development, the main limitations are the depth to rock, low load supporting capacity, the potential for shrinking and swelling, gravel in the surface layer, and slow permeability. Removal of pebbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

The suitability of the soil for septic tank absorption fields can be improved by ripping the hardpan to increase permeability. The limitation of slow permeability can also be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-3(21), irrigated and nonirrigated.

220—Salisbury gravelly clay loam, 5 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray gravelly clay loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown gravelly clay loam. The lower 16 inches is dark grayish brown and dark brown gravelly clay. The next layer is a strongly cemented hardpan about 8 inches thick. Below this to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones.

Included in this unit are small areas of Kuck clay loam, Lassen clay, Mary loam, and Medford clay loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Salisbury soil is slow above the impervious hardpan and rapid below it. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the depth to the hardpan and gravel in the surface layer. The hardpan can be ripped and shattered. This increases the effective rooting depth and improves internal drainage.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. Irrigation water should be applied at a rate that insures optimum production without increasing runoff, deep percolation, and erosion. In areas where the hardpan has not been ripped, irrigation water must be applied carefully to prevent the development of a perched water table. Drainage may also be required.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Diversions and grassed waterways may be needed. All tillage should be on the contour or across the slope. Gravel in the surface layer causes rapid wear of equipment used for tillage.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Irrigation water can be applied by the border and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bluebunch wheatgrass, Douglas rabbitbrush, sagebrush, and Idaho fescue.

If this unit is used for homesite development, the main limitations are depth to rock, low load supporting capacity, the potential for shrinking and swelling, slow permeability, and gravel in the surface layer. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

The suitability of the soil for septic tank absorption fields can be improved by ripping the hardpan to increase permeability. The limitation of slow permeability can also be overcome by increasing the size of the absorption field.

This map unit is in capability unit IIIe-3(21), irrigated and nonirrigated.

221—Salisbury cobbly loam, 0 to 9 percent slopes. This well drained soil is on terraces. It is moderately deep to a hardpan. The soil formed in alluvium derived

from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,500 to 4,500 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray cobbly loam about 4 inches thick. The upper 4 inches of the subsoil is dark grayish brown gravelly clay loam. The lower 16 inches is dark grayish brown and dark brown gravelly clay. The next layer is a strongly cemented hardpan about 8 inches thick. Below this to a depth of 60 inches or more is stratified sand, gravel, cobbles, and some stones. A few cobbles are on the surface in most places.

Included in this unit are small areas of Kuck clay loam, Lassen cobbly clay, a Mary loam that has slopes of 2 to 9 percent, Medford clay loam, and soils that have slopes of as much as 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Salisbury soil is slow above the impervious hardpan and rapid below it. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used as rangeland and for homesite development.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by cobbles on the surface. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Use of mechanical treatment practices is not practical because of the cobbly surface and steepness of slope.

The potential plant community on this unit includes Idaho fescue, western juniper, bluebunch wheatgrass, and sagebrush.

If this unit is used for homesite development, the main limitations are the depth to the hardpan, low load supporting capacity, the potential for shrinking and swelling, slow permeability, and cobbles on the surface. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

The suitability of the soil for septic tank absorption fields can be improved by ripping the hardpan to increase permeability. Use of sandy backfill for the trench and long absorption lines helps to compensate for the slow permeability.

This map unit is in capability unit IVe-7(21), irrigated and nonirrigated.

222—Settlemeyer loam, 0 to 2 percent slopes. This very deep soil is on flood plains. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray loam about 10 inches thick. The next layer is gray fine sandy loam, loam, and silt loam about 34 inches thick. Below this to a depth of 66 inches is a buried surface layer of gray silt loam and sandy clay loam.

Included in this unit are small areas of Esro silt loam, Diyou loam, Stoner gravelly sandy loam, and Riverwash. Also included are areas, in Scott Valley, where precipitation is as much as 18 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Settlemeyer soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at the surface from December through June but fluctuates between depths of 12 and 24 inches the rest of the year. This soil is subject to flooding about 3 years out of 10 during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the high water table and the hazard of flooding. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If the plant cover is disturbed, protection from flooding is needed to control gullying, streambank cutting, and sheet erosion.

The potential plant community on this unit includes carex, rush, tufted hairgrass, bluegrass, and redtop.

This map unit is in capability unit VIw-2(21), irrigated and nonirrigated.

223—Settlemeyer loam, drained, 2 to 5 percent slopes. This very deep, poorly drained soil is on flood plains. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 15 inches, the average

annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is gray loam about 10 inches thick. The next layer is gray fine sandy loam, loam, and silt loam about 34 inches thick. Below this to a depth of 66 inches is a buried surface layer of gray silt loam and sandy clay loam.

Included in this unit are small areas of Esro silt loam, Diyou loam, Stoner gravelly sandy loam, and Riverwash. Also included are small areas of a soil that is similar to this Settlemeyer soil but is in an area where the average annual precipitation is as much as 20 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Settlemeyer soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 0 to 24 inches from February through June. The rest of the year it is at a depth of 24 to 36 inches. This soil is subject to flooding during prolonged, high-intensity storms. About 1 year out of 10, channeling and deposition are common along streambanks.

This unit is used for hay and pasture and as rangeland.

This unit is suited to dryland hay and pasture. The main limitation is the seasonal high water table. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the seasonal high water table. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock. If the plant cover is disturbed, protection from flooding is needed to control gullying, streambank cutting, and sheet erosion.

The potential plant community on this unit includes carex, rush, tufted hairgrass, and bluegrass.

This map unit is in capability unit IIIw-2(21), irrigated and nonirrigated.

224—Settlemeyer Variant silt loam. This very deep, poorly drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. Slope is 0 to 2 percent. The native vegetation is mainly perennial grasses, sedges, and other water-tolerant plants. Elevation is 2,000 to 3,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is very dark gray and dark gray silt loam about 19 inches thick. The subsoil is dark gray, light olive gray, and olive gray silty clay loam about 49 inches thick. It is mottled with black, olive brown, light olive brown, olive gray, and olive. The substratum to a depth of 80 inches is greenish gray gravelly clay loam.

Included in this unit are small areas of a soil that is similar to this Settlemeyer Variant soil but is covered by sandy loam overwash 5 to 15 inches thick. Also included are small areas of soils that have slopes of as much as 9 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Settlemeyer Variant soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is very slow. A seasonal high water table is at a depth of 0 to 18 inches from December through April. The rest of the year the water table is at a depth of 18 to 36 inches. About 2 years in 10, this soil is subject to flooding for brief periods from December through March.

This unit is used for hay and pasture and as rangeland.

This unit is suited to irrigated hay and pasture. The main limitation is the high water table. Grasses and legumes that require good drainage can be grown if a deep tile drainage system is installed. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Sprinkler irrigation is the most suitable method of applying water. Irrigation water must be applied carefully to prevent the development of a perched water table.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by the high water table. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Plants that tolerate wetness should be seeded. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

Management practices suitable for use on this unit are proper range use, deferred grazing, rotation grazing, and aerial spraying for brush management.

The potential plant community on this unit includes carex, rush, tufted hairgrass, and bluegrass.

This map unit is in capability unit IIIw-2(21), irrigated and nonirrigated.

225—Sheld very stony sandy loam, 50 to 65 percent slopes. This deep, well drained soil is on mountains. It formed in volcanic ash overlain by residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed conifers. Elevation is 4,500 to 7,500 feet. The average annual precipitation is about 40 inches, the average annual air

temperature is about 41 degrees F, and the average frost-free period is about 50 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown very stony sandy loam about 7 inches thick. The next layer is brown gravelly sandy loam about 12 inches thick. The subsoil is brown and reddish gray very gravelly sandy loam and reddish gray and weak red very gravelly loam about 27 inches thick. Weathered rock is at a depth of 46 inches. Many stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Sheld soil but is underlain by bedrock at a depth of 20 to 40 inches, an Iller soil that has slopes of more than 50 percent, soils that are covered with stones and boulders, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Sheld soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used as woodland.

This unit is suited to the production of ponderosa pine, Douglas-fir, and white fir. It can produce about 2,613 cubic feet, or 11,680 board feet (Scribner rule), of timber per acre from a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, stoniness, equipment limitations, seedling mortality, and plant competition. Management that minimizes the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

The steepness of slope limits the kinds of equipment that can be used in forest management. The high-lead logging method is more efficient than most other methods and is less damaging to the soil surface. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. The low to moderate available water capacity generally influences seedling survival in areas where understory plants are numerous. Among the trees that are suitable for planting is white fir.

The understory includes bottlebrush squirreltail, snowbrush ceanothus, and California brome.

This map unit is in capability subclass VIIs(22), nonirrigated.

226—Sheld-Iller stony sandy loams, 9 to 30 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 4,500 to 7,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

This unit is 40 percent Sheld stony sandy loam and 25 percent Iller stony sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a soil that is similar to this Sheld soil but is underlain by bedrock at a depth of 20 to 40 inches, Rock outcrop, and soils that have slopes of as much as 50 percent. Included areas make up about 30 percent of the total acreage.

The Sheld soil is deep and well drained. It formed in volcanic ash deposited over residuum derived dominantly from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown stony sandy loam 7 inches thick. The next layer is brown gravelly sandy loam about 12 inches thick. The subsoil is brown and reddish gray very gravelly sandy loam and reddish gray and weak red very gravelly loam about 27 inches thick. Weathered rock is at a depth of 46 inches. A few stones are on the surface in most places.

Permeability of this Sheld soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

The Iller soil is very deep and well drained. It formed in volcanic ash deposited over residuum derived dominantly from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark brown and brown stony sandy loam about 13 inches thick. The subsoil is brown sandy loam about 15 inches thick. The next layer is a buried subsoil of yellowish brown very stony sandy loam and brown extremely stony loam about 37 inches thick. A few stones are on the surface in most places.

Permeability of this Iller soil is moderate. Available water capacity is low or moderate. Effective rooting depth is 60 inches or more. Runoff is medium or rapid, and the hazard of water erosion is moderate to high.

This unit is used as woodland.

This unit is suited to the production of white fir, California red fir, and ponderosa pine. The Sheld soil can produce about 2,613 cubic feet, or 11,680 board feet (Scribner rule), of timber per acre. The Iller soil can produce about 4,396 cubic feet, or 20,000 board feet, per acre. Production is estimated for a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality and plant competition. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. White fir is suitable for planting on this unit. In addition, California red fir and ponderosa pine are suitable on the Iller soil.

The understory on the Sheld soil includes bottlebrush squirreltail and snowbrush ceanothus. The understory on the Iller soil includes sierra chinquapin, California brome, and snowberry.

This map unit is in capability subclass VIe(22), nonirrigated.

227—Sheld-Iller stony sandy loams, 30 to 50 percent slopes. This map unit is on mountains. The native vegetation is mainly mixed conifers. Elevation is 4,500 to 7,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

This unit is 45 percent Sheld stony sandy loam and 20 percent Iller stony sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to this Sheld soil but are underlain by bedrock at a depth of 20 to 40 inches, 10 percent Rock outcrop, and 10 percent Snell very stony loam that has slopes of 5 to 30 percent, soils that are covered with stones and boulders, and soils that have slopes of as much as 75 percent. Included areas make up about 35 percent of the total acreage.

The Sheld soil is deep and well drained. It formed in volcanic ash deposited over residuum derived dominantly from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 2 inches thick. The surface layer is dark brown and brown stony sandy loam 7 inches thick. The next layer is brown gravelly sandy loam about 12 inches thick. The subsoil is brown and reddish gray very gravelly sandy loam and reddish gray and weak red very gravelly loam about 27 inches thick. Weathered rock is at a depth of 46 inches. A few stones are on the surface in most places.

Permeability of the Sheld soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Iller soil is very deep and well drained. It formed in volcanic ash deposited over residuum derived dominantly from extrusive igneous rock. Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark brown and brown stony sandy loam about 13 inches thick. The subsoil is brown sandy loam about 15 inches thick. Below this is a buried subsoil of yellowish brown very stony sandy loam and brown extremely stony sandy clay loam about 37 inches thick. A few stones are on the surface in most places.

Permeability of the Iller soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as woodland.

This unit is suited to the production of white fir, California red fir, and ponderosa pine. The Sheld soil can produce about 2,613 cubic feet, or 11,680 board feet (Scribner rule), of timber per acre. The Iller soil can produce about 4,396 cubic feet, or 20,000 board feet, per acre. Production is estimated for a fully stocked stand of even-aged ponderosa pine trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, seedling mortality, and plant competition. The steepness of slope limits the kinds of equipment that can be used in forest management.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. White fir is suitable for planting on this unit. In addition, California red fir and ponderosa pine are suitable on the Iller soil.

The understory on the Sheld soil includes bottlebrush squirreltail and snowbrush ceanothus. The understory on the Iller soil includes sierra chinquapin, California brome, and snowberry.

This map unit is in capability subclass VIe(22), nonirrigated.

228—Snell very stony loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on mountains. It formed in residuum derived dominantly from extrusive igneous rock. The native vegetation is mainly mixed oak and juniper woodland with associated shrubs, grasses, and forbs. Elevation is 4,800 to 6,500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is about 50 days.

Typically, the surface layer is grayish brown very stony loam about 4 inches thick. The subsoil is brown very cobbly clay loam and very cobbly clay about 17 inches thick. Bedrock is at a depth of 21 inches. Many stones are on the surface in most places.

Included in this unit are small areas of a soil that is similar to this Snell soil but has a stony loam subsoil, soils that are covered with stones and boulders, Rock outcrop, and soils that have slopes of more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Snell soil is moderately slow. Available water capacity is very low to low. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by stones on the surface. Use of mechanical treatment practices is not practical because of the stony surface. Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes Idaho fescue, western juniper, antelope bitterbrush, and mountainmahogany.

This map unit is in capability subclass VIIs(22), nonirrigated.

229—Stoner gravelly sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is brown gravelly sandy loam about 12 inches thick. The upper 24 inches of the subsoil is brown and light yellowish brown gravelly sandy loam. The lower 24 inches is strong brown very gravelly loam.

Included in this unit are small areas of Bonnet gravelly loam, Dotta gravelly loam, Diyou loam, soils that are highly stratified with layers of various textures, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Stoner soil is moderate. Available water capacity is low or moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley (fig. 3). It is limited mainly by the gravelly surface layer. Gravel in the surface layer causes rapid wear of equipment used for tillage.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Leveling is needed in sloping areas for the efficient application and removal of irrigation water. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the border and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bottlebrush squirreltail, bluebunch wheatgrass, Idaho fescue, and buckbrush.

This unit is suited to homesite development. It has few limitations. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

This map unit is in capability unit IIIs-4(21), irrigated and nonirrigated.

230—Stoner gravelly sandy loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is brown gravelly sandy loam about 12 inches thick. The upper 24 inches of the subsoil is brown and light yellowish brown gravelly sandy loam. The lower 24 inches is strong brown very gravelly loam.

Included in this unit are small areas of Bonnet gravelly loam, Dotta gravelly loam, Riverwash, and a Stoner gravelly sandy loam that has slopes of 5 to 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Stoner soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion

Figure 3.—Irrigated barley on Stoner gravelly sandy loam, 0 to 2 percent slopes. Mt. Shasta is in the background.

and the gravelly surface layer. Gravel in the surface layer causes rapid wear of equipment used for tillage.

In summer, irrigation is required for maximum production of most crops. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Tilling on the contour or across the slope reduces erosion. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Irrigation water can be applied by the border and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bottlebrush squirreltail, bluebunch wheatgrass, Idaho fescue, and buckbrush.

This unit is suited to homesite development. It has few limitations. Mulching, fertilizing, and irrigating help to establish lawn grasses and other small seeded plants. Preserving the existing plant cover during construction helps to control erosion.

This map unit is in capability unit IIIe-4(21), irrigated and nonirrigated.

231—Stoner gravelly sandy loam, 5 to 15 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from mixed rock sources. The vegetation in areas not cultivated is mainly

perennial grasses, forbs, and shrubs. Elevation is 2,000 to 4,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is brown gravelly sandy loam about 12 inches thick. The upper 24 inches of the subsoil is brown and light yellowish brown gravelly sandy loam. The lower 24 inches is strong brown very gravelly loam.

Included in this unit are small areas of Bonnet gravelly loam, a Dotta gravelly loam that has slopes of 2 to 5 percent, Riverwash, and a soil that is similar to this Stoner gravelly sandy loam but has slopes of more than 15 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Stoner soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slope, the hazard of erosion, and the gravelly surface layer. Gravel in the surface layer causes rapid wear of equipment used for tillage.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is suited to this unit. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs.

Tilling on the contour or across the slope reduces erosion. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to hay and pasture. The main limitation is slope. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Because of slope, irrigation water can best be applied by sprinklers.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use.

The potential plant community on this unit includes bottlebrush squirreltail, bluebunch wheatgrass, Idaho fescue, and buckbrush.

This unit is suited to homesite development. The main limitations are slope and the hazard of erosion. The steepness of slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

Mulching, fertilizing, and irrigating help to establish lawn grasses and other small seeded plants. Preserving the existing plant cover during construction helps to control erosion, which is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

This map unit is in capability unit IIIe-4(21), irrigated and nonirrigated.

232—Terwilliger silty clay loam, 2 to 9 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from siltstone. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,200 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray silty clay loam about 6 inches thick. The upper 13 inches of the subsoil is pale brown and light olive brown silty clay loam. The lower 15 inches is light yellowish brown silty clay and olive gravelly silty clay. Weathered rock is at a depth of 34 inches. In some areas the surface layer is silt loam.

Included in this unit are small areas of Hilt sandy loam, Mary loam, Salisbury clay loam, Medford clay loam, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Terwilliger soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by the hazard of erosion and slow permeability.

In summer, irrigation is required for maximum production of most crops. Contour ditch and sprinkler irrigation systems are suited to the unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Tilling on the contour or across the slope reduces erosion.

This unit is suited to hay and pasture. The main limitation is slope. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Because of slope, irrigation water can best be applied by the contour ditch and sprinkler methods.

This unit is suited to use as rangeland. It has few limitations. The soil in the unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing

should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. The main limitations are slope, depth to rock, slow permeability, low load supporting capacity, and the potential for shrinking and swelling. The deep cuts needed to provide essentially level building sites can expose bedrock.

Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Slow permeability and limited depth to bedrock increase the possibility of failure of septic tank absorption fields. Because of this, onsite investigation is required to determine the proper design for a waste disposal system.

This map unit is in capability unit IIIe-5(21), nonirrigated.

233—Terwilliger silty clay loam, 9 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from siltstone. The vegetation in areas not cultivated is mainly perennial grasses, forbs, and shrubs. Elevation is 2,200 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray silty clay loam about 6 inches thick. The upper 13 inches of the subsoil is pale brown and light olive brown silty clay loam. The lower 15 inches is light yellowish brown silty clay and olive gravelly silty clay. Weathered rock is at a depth of 34 inches. In some areas the surface layer is silt loam.

Included in this unit are small areas of Hilt sandy loam, Mary loam, a Salisbury clay loam that has slopes of 2 to 9 percent, Medford clay loam, Rock outcrop, and a Terwilliger silty clay loam that has slopes of as much as 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Terwilliger soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for cultivated crops, hay and pasture, rangeland, and homesite development.

This unit is suited to irrigated and nonirrigated wheat and barley. It is limited mainly by slope and the hazard of erosion.

In summer, irrigation is required for maximum production of most crops. Because of slope, contour ditch and sprinkler irrigation systems are best suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, water should be applied at a slow rate over a long period to insure that the root zone is properly wetted.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Tilling on the contour or across the slope reduces erosion.

This unit is suited to hay and pasture. The main limitation is slope. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Because of slope, irrigation water should be applied by the contour ditch or sprinkler method.

This unit is suited to use as rangeland. It has few limitations. The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This unit is suited to homesite development. The main limitations are slope, depth to rock, slow permeability, low load supporting capacity, and the potential for shrinking and swelling. The deep cuts needed to provide essentially level building sites can expose bedrock.

Preserving the existing plant cover during construction helps to control erosion. Mulching, fertilizing, and irrigating are needed to establish lawn grasses and other small seeded plants.

If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Slow permeability and limited depth to bedrock increase the possibility of failure of septic tank absorption fields. Because of this, onsite investigation is required to determine the proper design for a waste disposal system.

This map unit is in capability unit IIIe-5(21), irrigated and nonirrigated.

234—Terwilliger silty clay loam, 15 to 50 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from

siltstone. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 2,200 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray silty clay loam about 6 inches thick. The upper 13 inches of the subsoil is pale brown and light olive brown silty clay loam. The lower 15 inches is light yellowish brown silty clay and olive gravelly silty clay. Weathered rock is at a depth of 34 inches. In some areas the surface layer is silt loam.

Included in this unit are small areas of Hilt sandy loam, Mary loam, a Medford clay loam that has slopes of as little as 5 percent, Rock outcrop, and a soil that is similar to this Terwilliger soil but has slopes of more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Terwilliger soil is slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas.

The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes Idaho fescue, bluebunch wheatgrass, beardless wheatgrass, and buckbrush.

This map unit is in capability subclass VIe(21), nonirrigated.

235—Terwilliger stony silty clay loam, 2 to 50 percent slopes. This moderately deep, well drained soil is on hills. It formed in residuum derived dominantly from siltstone. The native vegetation is mainly perennial grasses, forbs, and shrubs. Elevation is 2,200 to 3,500 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface layer is light brownish gray stony silty clay loam about 6 inches thick. The upper 13 inches of the subsoil is pale brown and light olive brown silty clay loam. The lower 15 inches is light yellowish brown silty clay and olive gravelly silty clay. Weathered rock is at a depth of 34 inches. A few stones are on the surface in most places. In some areas the surface layer is stony silt loam.

Included in this unit are small areas of Mary stony loam, Medford clay loam, Rock outcrop, and a soil that is similar to this Terwilliger soil but has slopes of more than 50 percent. Included areas make up about 20 percent of the total acreage.

Permeability of this Terwilliger soil is slow. Available water capacity is very low to moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope and stones on the surface. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Use of mechanical treatment practices is not practical because of the stony surface and steepness of slope.

The soil in this unit responds well to fertilizer, to range seeding, and to proper grazing use. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes Idaho fescue, white oak, rabbitbrush, big sagebrush, and western juniper.

This map unit is in capability subclass VIe(21), nonirrigated.

236—Uhlig Variant stony loam, 5 to 50 percent slopes. This deep, well drained soil is on terrace escarpments. It formed in alluvium derived dominantly from extrusive igneous rock. The native vegetation is mainly perennial grasses, shrubs, and forbs. Elevation is 2,500 to 4,000 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is about 125 days.

Typically, the surface is covered with a mat of undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris about 1 inch thick. The surface layer is dark grayish brown stony loam about 14 inches thick. The subsoil is pale brown stony loam about 28 inches thick. Soft rock is at a depth of 42 inches. A few stones are on the surface in most places.

Included in this unit are small areas of a Delaney sandy loam that has slopes of 2 to 5 percent, Redola loam, and a soil that is similar to this Uhlig soil but is more than 60 inches deep to soft rock. Included areas make up about 25 percent of the total acreage.

Permeability of this Uhlig Variant soil is moderate. Available water capacity is very low to moderate. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used as rangeland.

This unit is suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope and stones on the surface. Use of mechanical treatment practices is not practical because of

steepness of slope and the stony surface. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas.

Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

The potential plant community on this unit includes bottlebrush squirreltail, Idaho fescue, bluebunch wheatgrass, and western juniper.

This map unit is in capability subclass VIe(21), nonirrigated.

237—Weitchpec Variant-Rock outcrop complex, 5 to 65 percent slopes. This map unit is on mountains. The native vegetation is mainly brush and juniper. Elevation is 2,500 to 5,000 feet. The average annual precipitation is about 35 inches, the average annual air temperature is about 48 degrees F, and the average frost-free period is about 125 days.

This unit is 40 percent Weitchpec gravelly loam and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of a Dubakella stony loam that has slopes of 30 to 50 percent and a soil that is similar to this Weitchpec Variant soil but is underlain by bedrock at a depth of 20 to 40 inches. Included areas make up about 30 percent of the total acreage.

The Weitchpec Variant soil is shallow and well drained. It formed in residuum derived dominantly from serpentine. Typically, the surface layer is grayish brown gravelly loam about 4 inches thick. The upper 4 inches of the subsoil is grayish brown gravelly clay loam. The lower 8 inches is grayish brown very gravelly clay loam. Bedrock is at a depth of 16 inches.

Permeability of this Weitchpec Variant soil is moderately slow. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium to very rapid, and the hazard of water erosion is moderate to very high.

Rock outcrop consists of exposed areas of bedrock. It supports no vegetation.

This unit is used as rangeland.

This unit is poorly suited to use as rangeland. The production of vegetation suitable for livestock grazing is limited by slope, the areas of Rock outcrop, and shallow soil depth. Use of mechanical treatment practices is not practical because of the many areas of Rock outcrop and steepness of slope. Steepness of slope and the areas of Rock outcrop also limit access by livestock and promote overgrazing of the less sloping areas. Trails or walkways can be constructed in places to encourage livestock grazing in areas where access is limited.

Management practices suitable for use on this unit are proper range use, deferred grazing, and rotation grazing. Grazing should be delayed until the soil in the unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

The potential plant community on this unit includes manzanita, western juniper, and buckbrush.

This map unit is in capability subclass VIIs(5), nonirrigated.

238—Xerofluvents, nearly level. This map unit consists of soils on flood plains of major streams throughout the survey area. It is flooded about 2 years in 4. The vegetation is mainly willows, cottonwood, blackberry, and sparse stands of grass. The mean annual precipitation is 17 to 50 inches, and the mean annual air temperature is 48 to 52 degrees F. The average frost-free season is about 100 days.

The soils in this unit are multicolored, stratified sand, loamy sand, gravelly sandy loam, and gravel. Drainage is excessive, and the hazards of erosion and deposition are very high. Permeability is variable. Effective rooting depth is 36 to 60 inches. Available water capacity is very low. Surface runoff is slow.

Included in this unit are about 15 percent Riverwash and 10 percent Deetz stony loamy sand, Diyou loam, Rock outcrop, and Rubble land.

This unit is used as watershed and for wildlife habitat.

This map unit is in capability subclass VIIw, dryland.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

By Edward S. Anderson, soil conservationist, and Larry A Day, conservation agronomist, Soil Conservation Service.

The main management practices applicable to the soils in the survey area that are suited to crops and pasture are those that help to maintain or improve production and that minimize erosion. Among these practices are conservation cropping systems, crop residue management, proper tillage, irrigation water management, erosion control, excess water removal, pasture management, summer fallow, and subsoiling. These practices are briefly discussed in the following paragraphs.

Conservation cropping systems are systems for growing crops in combination with needed cultural and management practices. If soil improving crops and practices used in the system more than offset the soil depleting crops and deteriorating practices, then it is a good conservation cropping system. Cropping systems are needed on all tilled soils in the survey area.

Soil improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes, the return of crop residue to the soil, the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Crop residue management consists of returning crop residue to the soil. Residue returned to the soil helps to maintain soil structure, organic matter content, and fertility, and it helps to control erosion. On sloping soils, residue should be left on the soil surface during periods when the risk of erosion is greatest.

Proper tillage consists of using the minimum number of operations necessary to control weeds, incorporate crop residue, obtain favorable air and water movement in the soil, and prepare an adequate seedbed. Tillage breaks down soil structure, reduces the organic matter content of the soil, and can create a plowpan below the depth of tillage. Loss of soil structure and organic matter increases the hazard of soil erosion, and the plowpan limits permeability and restricts root penetration. Varying the depth of tillage retards the development of a plowpan, and infrequent shallow chiseling helps to break up the pan. Combining tillage operations to reduce the number of trips over a field and delaying tillage while soils are wet are other important ways of maintaining soil tilth and minimizing compaction.

Irrigation water management is achieved by controlling the rate, amount, and timing of applications of irrigation water. It is designed to use the available irrigation water to supply the moisture needed by crops while minimizing soil erosion and plant nutrient loss. Also, it reduces water loss and protects water quality.

Irrigation methods used in the soil survey area are furrow, border, corrugation, sprinkler, and contour ditch systems. Furrow, border, and corrugation irrigation should be limited to slopes of 4 percent or less. Contour ditch irrigation should be used on slopes of more than 4

percent. Sprinkler irrigation is suited to all tillable soils of the area. Irrigation water should be applied at a rate and in amounts adequate for crop needs and soil characteristics without excess runoff or deep percolation. To help conserve water, irrigation canals should be lined and irrigation pipelines should be used where possible.

Erosion control generally is needed on sloping soils and on all soils subject to soil blowing. Erosion can be recognized by the accumulation of soil material at the base of slopes, in drainageways, and along fence lines, or it is evidenced by rills and gullies on side slopes.

Many practices are used to control erosion. Land leveling or smoothing, selection of the best method of irrigation, and control of irrigation water help to control erosion on irrigated soils. Crop residue use, proper tillage, and cross-slope farming are some of the management practices used to control erosion.

Structural measures, used either individually or in combination, also may be needed to control erosion. Streambanks can be stabilized by installing rock riprap or by planting vegetation to stabilize the soils, or by both. Gullies can be shaped and planted to grass.

Excess water removal is needed to remove excess water that accumulates either as a result of rainfall or irrigation. Excess water may be a problem in low-lying areas, in swales, or at the lower end of irrigated fields. It results in decreased crop production. Using tailwater return systems allows waste water to be reused.

Excess water may be controlled by shaping and grading, land leveling, constructing open drainage ditches, and properly managing irrigation water.

Pasture management is needed for irrigated and nonirrigated pastures to prevent soil deterioration, provide for maximum production, maintain a desirable plant community, and extend the life of the pasture.

Kuck, Lassen, Montague, and Bonnet soils are suitable for nonirrigated pastures that are planted to grasses and legumes in alternate rows. Fertilizer should be banded 2 inches deep and 2 inches to the side of the seed. During the year of establishment, grazing should not be permitted and annual weeds should be mowed.

After pasture is established, grazing should not start until the plants are about 6 to 10 inches high and livestock should be removed when plants are 3 to 6 inches high. Every fourth year each pasture should be allowed to head out before grazing.

In irrigated pastures, legumes should make up no more than 20 percent of the planting mix. The pasture should be seeded in a firm seedbed early in spring. The new pasture should not be grazed until the plants are well established and are at least 8 inches high. The plants should not be grazed closer than 4 inches. Rotation grazing using a minimum of three fields is a suitable practice. This enables the fields to dry out after irrigation, reduces compaction, and allows for regrowth of the plants.

Nitrogen and phosphorus are required on pastures.

Summer fallow is a way of keeping the land free of vegetation during one crop season and storing moisture for crop production the following season. It also helps to control weeds, plant diseases, and insects. Under a summer fallow system of farming, crop production tends to be more stable and complete crop failures during years of low rainfall are less frequent.

Subsoiling is a method of shattering the hardpan in a soil by means of a ripping attachment mounted on a tractor. Subsoiling enhances permeability and internal drainage, helps to prevent development of a perched water table, allows deeper root penetration, and may increase available water capacity.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service and the Storie index used by the University of California are explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitaions that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. The numbers used to designate units within the subclasses are as follows:

0.—Indicates that a problem or limitation is caused by stony, cobbly, or gravelly material in the substratum.

1.—Indicates that a problem or limitation is caused by slope or by actual or potential erosion hazard.

2.—Indicates that a problem or limitation of wetness is caused by poor drainage or flooding.

3.—Indicates that a problem or limitation of slow or very slow permeability of the subsoil or substratum is caused by a clayey subsoil or a substratum that is semiconsolidated.

4.—Indicates that a problem or limitation is caused by sandy or gravelly soils with a low available water capacity.

5.—Indicates that a problem or limitation is caused by a fine textured or very fine textured surface layer.

6.—Indicates that a problem or limitation is caused by salt or alkali.

7.—Indicates that a problem or limitation is caused by rocks, stones, or cobbles.

8.—Indicates that a problem or limitation exists in the root zone, which generally is less than 40 inches thick over massive bedrock and lacks moisture for plants.

9.—Indicates that a problem or limitation is caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

No unit designations are shown for class I soils, because soil characteristics are similar for all soils in this class. Unit designations also are not shown for class V through VIII soils, because these soils are not intensively managed as cropland.

Capability groupings are identified in the description of each soil map unit in the section "Detailed soil map units."

land resource areas

In this survey area, capability classification is further refined by designating land resource areas in which the

soils in a unit occur. A land resource area is a broad geographic area that has a distinct combination of climate, soils, vegetation, management needs, and cropping systems. Parts of three of these nationally designated areas are in this survey area. These areas are designated as 5, 21, and 22. Land resource area 5 is made up of the Siskiyou-Trinity area, area 21 is made up of Klamath and Shasta Valleys and Basins, and area 22 is made up of the Sierra Nevada Range.

Land resource area 5.—This area includes about 41 percent of the survey area. It consists of hills and mountains. The soils are gently sloping to very steep. Elevation ranges from 2,000 to 6,000 feet. Average annual rainfall ranges from 20 to 30 inches. The soils are used as woodland and rangeland.

Land resource area 21.—This area includes about 44 percent of the survey area. It consists of valley floors and adjacent terraces of the Shasta and Scott Rivers. The soils are nearly level to very steep. Elevation ranges from 2,000 to 4,500 feet. Average annual rainfall ranges from 13 to 18 inches. The soils are used as rangeland, for hay, and for irrigated and nonirrigated wheat, barley, and pasture.

Land resource area 22.—This area includes about 15 percent of the survey area. It consists of hills and mountains. The soils are gently sloping to very steep. Elevation ranges from 2,700 to 7,500 feet. Average annual rainfall ranges from 30 to 40 inches. The soils are used as woodland and rangeland and for dryfarmed grain.

Land resource areas are given in parentheses as part of the capability classification following the description of each soil map unit in the section "Detailed soil map units."

storie index rating

By Gordon L. Huntington, lecturer and soil specialist, Department of Land, Air, and Water Resources, University of California, Davis.

In table 6, the soils in the survey area are rated according to the Storie index (*7, 8, 9*). This index expresses numerically the relative degree of suitability of a soil for general intensive agricultural use as it exists at the time of evaluation. The rating is based on soil characteristics only and is obtained by evaluating factors such as depth, surface soil texture, subsoil characteristics, drainage, salts and alkali, and relief. Other factors, such as availability of water for irrigation, climate, and distance to markets, that might determine the desirability of growing certain plants in a given locality are not considered. Therefore, in itself, the index should not be used as a direct indicator of land value. However, where economic factors are known to the user, the Storie index provides additional objective information for land tract value comparisons.

Four general factors are used in determining the index rating: (A) the permeability of the soil profile and soil depth; (B) the texture of the surface soil; (C) the dominant slope of the soil body; and (X) other factors more readily subject to management or modification. In this survey area the X factors include drainage, erosion, microrelief, nutrient level, salts and sodium, and soil acidity. For some soils more than one of the X factors are used in rating. Each of the four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable or ideal condition for general crop production. Lower percentage ratings are selected from data and observations that relate soil properties to plant growth and crop yield (*7*). In the tables currently used (*8, 9*), certain soil properties are allowed ranges of values to conform with variations of the properties in relation to their effect on the suitability of the soil for general agricultural purposes; for example, soil depth or proportion of gravel present in a gravelly loam surface soil. The modal condition of a soil property, as it is described in a soil map unit, is used to select a value for rating when a range of tabular values exists.

The index rating for a soil is obtained by multiplying the rating values given to its four factors, A, B, C, and X. If more than one X factor exists for a soil, the values for the additional factor, or factors, act as additional multipliers. Thus, any factor may dominate or control the final rating. For example, consider a soil such as Diyou loam. It is a deep soil with a moderately slowly permeable profile and an effective rooting depth of 60 inches or more. This warrants a rating of 95 for factor A. It has a workable loam surface soil, warranting a rating of 100 for factor B. A smooth, nearly level surface to the soil justifies 100 percent for factor C. However, it is subject to flooding, warranting a value of 80, and has a water table at a depth of 2 to 3 feet, warranting a value of 60. Multiplied together, this produces a rating of 48 for factor X. Multiplying A, B, C, and X gives a Storie index of 46 for Diyou loam. If, in time, the water table can be lowered and the flood hazard decreased, the Storie index can be increased by assigning appropriate higher values to the X factors to reflect the changed conditions. Diyou loam, drained, with an index value of 72, is an example.

Soil complexes in the survey area, such as Duzel-Jilson-Facey complex, 15 to 50 percent slopes, are rated to reflect the proportion of the dominant soils described in the unit. Each of the dominant soils in such complexes is rated separately and the values shown in table 6. The single index value for each complex is a weighted average. Miscellaneous area map units, such as Dumps, Rock outcrop, or Lava flows, are not evaluated in terms of the factors A, B, C, or X. They have features that are very severely limiting for agricultural use of any kind. As such, they are assigned an index value of less than 10.

Soils are placed in grades according to their suitability for general intensive agriculture as shown by their Storie

index ratings. The six grades and their range in index ratings are:

	Index rating
Grade 1	80 to 100
Grade 2	60 to 80
Grade 3	40 to 60
Grade 4	20 to 40
Grade 5	10 to 20
Grade 6	Less than 10

In this area, soils in *Grade 1* are well suited to intensive use for irrigated crops that are climatically adapted to the region. *Grade 2* soils are good agricultural soils, although they are not so desirable as soils in Grade 1 because of heavier or coarser surface soil texture, a somewhat less permeable subsoil, a slight hazard of flooding or moderate depth to a water table, gentle to moderate slopes, or slight accumulations of salts and sodium. *Grade 3* soils are only fairly well suited to agriculture and are limited in their use because of moderate to steep slopes, moderate to shallow soil depth, low fertility level, rock outcroppings, clayey surface soil texture, hazard of flooding, poor drainage, or stones and gravel on the surface. *Grade 4* soils are poorly suited. They are severely limited in their agricultural potential because of shallower depth, steeper slopes, more numerous rock outcroppings, more frequent flooding, or poorer drainage than for soils in Grade 3. *Grade 5* soils are very poorly suited to agriculture. *Grade 6* consists of soils and miscellaneous areas that are not suited at all because of very severe to extreme limitations with regard to the aforementioned properties, including, in some cases, strong saline or sodic conditions.

rangeland

By Warren E Peden, range conservationist, Soil Conservation Service

About 44 percent of the survey area is rangeland. Most ranches are cow-calf-steer operations. The average size of the ranches is about 1,000 acres. In summer, many of the ranches have access to grazing lands administered by the Forest Service.

Soils strongly influence the natural vegetation. In the northeastern part of the survey area, most of the soils are clayey and are moderately deep over tuff and basalt. These soils support perennial and annual grasses and forbs, shrubs, and trees. In much of the southwestern part of the survey area, the soils are loams and gravelly loams that are underlain by metamorphic rock. Production on these loamy soils is fair to good depending on depth and exposure. Soils on north-facing slopes commonly are more productive than those on south-facing slopes.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 7 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as or are suited to rangeland are listed. Explanation of the column headings in table 7 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre reduced to a common percent of air-dry moisture.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management

generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of water erosion and soil blowing. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The major concerns for rangeland in the area include, but are not limited to, proper grazing use, fertilization, range seeding, planned grazing systems, and brush management. Technical assistance on planning rangeland management and applying practices that are suited to the soils on a particular ranch can be obtained from local representatives of the Soil Conservation Service and Cooperative Extension Service.

In the paragraphs that follow, the chief management concerns for all soils in the survey area used as rangeland are briefly discussed.

Proper grazing use is grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water. It also increases forage production and helps to maintain the natural beauty.

Plant cover is needed to protect soils from erosion and to maintain good forage production. The key forage producing grasses, grasslike plants, and forbs should not be grazed closer than 50 percent of their annual growth. Important shrubs should not be grazed more than 60 percent of their annual growth.

Fertilization may be necessary to aid in the initial establishment of desirable plants to control erosion or to improve the existing plant cover. Fertilization increases forage production and lengthens the growing period. In areas where rainfall is less than 12 inches, fertilization is not usually desirable. Whenever a range reseeding program is used, fertilization should be considered.

Range seeding is used to establish desirable plants on rangeland, to produce more forage, or to convert land from other uses to rangeland. It improves the natural beauty of rangeland and reduces soil and water loss.

Planned grazing systems are used to achieve more uniform grazing use. Any grazing system should be keyed to high-producing plants that are locally abundant. Grazing systems are flexible methods of alternating rest with grazing.

Brush management is designed to reduce or eliminate competition of woody vegetation to allow understory grasses and forbs to recover, or to make conditions favorable for reseeding. It increases production of forage, which reduces erosion. Brush management may improve the habitat for some species of wildlife. Mechanical, chemical, or biological methods are used to manage brush.

woodland management and productivity

By John W Bramhall, forester, Soil Conservation Service

The woodland in the survey area provides wood products for sale or for use on farms and ranches. It also protects the watersheds of Scott and Shasta Valleys, provides food and cover for wildlife, and serves as recreation areas for many people.

The timber produced in the area is used for lumber, plywood, and wood chips, which are produced in wood processing plants located throughout the area. Use of the timber as firewood has been increasing in recent years.

The principal forest cover types in the area are (1) ponderosa pine, sugar pine, and fir; (2) Pacific ponderosa pine; and (3) Pacific ponderosa pine and Douglas-fir. The ponderosa pine, sugar pine, and fir forest type is marked by the predominance of ponderosa pine, sugar pine, white fir, Douglas-fir, or incense-cedar occurring either alone or in combination, provided significant amounts of white fir are present when ponderosa pine or Douglas-fir is the dominant species.

The Pacific ponderosa pine forest type has ponderosa pine occurring in pure stands; that is, the stands are 80 percent or more ponderosa pine. White fir is not present in significant amounts; that is, it makes up 20 percent of the stand or less. Sugar pine is mixed with the ponderosa pine, especially on the better sites, and incense-cedar, Douglas-fir, and small amounts of white fir are present in places.

The Pacific ponderosa pine and Douglas-fir forest type is mainly ponderosa pine and Douglas-fir, although neither species makes up as much as 80 percent of the stand. White fir is not present in significant amounts. Incense-cedar, sugar pine, and a wide variety of hardwoods and other conifers are commonly present in small amounts.

About 301,840 acres, or 34 percent of the area, is in forest cover. This acreage is mainly on uplands, although this has not always been the case. Some of the land has been cleared for cultivated crops and grazing. Fire has been a limiting factor in other areas, many of which are now covered with brush. Many timberlands have been harvested three or four times. Most of the small private ownerships have no remaining merchantable timber. It will be many years before the timber on these lands is again ready for harvest.

Volume estimates for the major species of tree in the survey area are given in the detailed soil map units. Volume estimates for Douglas-fir were taken from USDA Technical Bulletin 201; estimates in cubic feet were obtained from table 2, and those in board feet from table 4. Volume estimates for ponderosa pine were taken from USDA Technical Bulletin 630; estimates in cubic feet were obtained from table 15, and those in board feet from table 16.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops.

Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 9 shows, for each soil suitable for woodland use, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4 1/2 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

Table 9 also lists the common names of the characteristic vegetation on each soil and the percentage composition, by air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

windbreaks and environmental plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops

from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service, the California Department of Forestry, or the Cooperative Extension Service or from a nursery.

recreation

By D. W Patterson, biologist, Soil Conservation Service

Outdoor recreation opportunities are seasonal in the soil survey area because of the cold, wet weather late in fall, in winter, and early in spring. Summer tourism and recreation are important in the area. More rugged forms of recreation such as deer hunting and fishing for steelhead and salmon, however, are enjoyed during cold weather. Access for fishing is restricted because of the private ownership patterns along major sections of salmon and steelhead fishing waters, such as the Scott and Klamath Rivers. Hunting and fishing opportunities are greater for the general public on public lands.

The survey area is somewhat removed from population centers, and access to the area is by U.S. Interstate 5. Many secondary roads are unpaved.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

wildlife habitat

By D. W. Patterson, biologist, Soil Conservation Service.

Fish and wildlife provide opportunities for both recreation and income, and they add to the quality of life in the survey area. Rangeland and wooded areas interspersed with or adjacent to both irrigated and dryfarmed areas provide many habitats suited to a variety of game and nongame wildlife species. Isolated wetlands offer habitat for both migratory and nesting shore birds and waterfowl, including the Great Basin Canada goose and sandhill crane.

Rangelands dominated by a mixture of brush, grasses, and trees are key habitat areas for wintering herds of Rocky Mountain and California mule deer. Further discussion of wildlife species and their habitats, as well as general wildlife habitat management considerations are given for each general soil map unit described in the section "General soil map units."

Numerous streams traverse the survey area. They support trout fisheries as well as streamside vegetation that provides valuable food and cover for wildlife and fish. The Scott River provides fishing for both steelhead trout and salmon. Farm ponds provide fishing for trout and warm-water fish such as largemouth black bass, bluegill, and catfish.

Adapted trees and shrubs can be planted in odd areas along roads, fences, and field borders to provide both food and cover for wildlife. Soils best suited for plantings are medium textured and are at least 4 feet deep. With the exception of wet or moist soils, all shrub and tree plantings should receive adequate irrigation during the first 2 years of establishment. They should also be protected from livestock and competition from weeds. More information on wildlife plants and establishment methods can be obtained from local offices of the Soil Conservation Service and Cooperative Extension Service or from nurseries.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, wheatgrass, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are native wheatgrasses, native fescue, native bluegrass, saltgrass, wild mustard, sweetclover, lupine, vetch, and buckwheat.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, willow, wild plum, maple, alder, dogwood, and ash. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are deerbrush, mountainmahogany, bitterbrush, snowberry, and sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland

plants are smartweed, burreed, cattail, saltgrass, reed canarygrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include deer, bear, dove, band-tailed pigeon, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include cottontail, jackrabbit, California mule deer, Rocky Mountain mule deer, sage grouse, meadowlark, kingbirds, and mountain bluebird.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

sanitary facilities

Table 14 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct

surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent.

Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas or in areas where the cover has been disturbed by overgrazing or excessive traffic. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. In this survey area, wind erodibility groups are shown only for the soils in an area east and northeast of Lake Shastina. Winds in this area are at a velocity that can cause soil blowing, resulting in damage to the soils and plants. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are very highly erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are moderately erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are moderately erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 18, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 19 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 19 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 19 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 19.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Cemented pans are cemented or indurated subsurface layers within a depth of 5 feet. Such pans cause difficulty in excavation. Pans are classified as thin or thick. A thin pan is less than 3 inches thick if continously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A thick pan is more than 3 inches thick if continously indurated or more than 18 inches thick if discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*13*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 20, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (*Xer*, meaning dry, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralfs (*Hapl*, meaning minimal horizonation, plus *xeralf*, the suborder of the Alfisols that have a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, montmorillonitic, mesic Typic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*12*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*13*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Asta series

The Asta series consists of very deep, well drained soils on glacial outwash terraces (fig. 4). These soils formed in volcanic ash overlying glacial outwash. Slope ranges from 5 to 50 percent.

Typical pedon of Asta gravelly sandy loam, 5 to 15 percent slopes; 800 feet west and 1,680 feet south of the northeast corner of sec. 32, T. 40 N., R. 4 W.

O1—2 inches to 1 inch; undecomposed needles, leaves, bark, twigs, and other organic debris.

O2—1 inch to 0; partially decomposed needles, leaves, twigs, bark, and other organic debris.

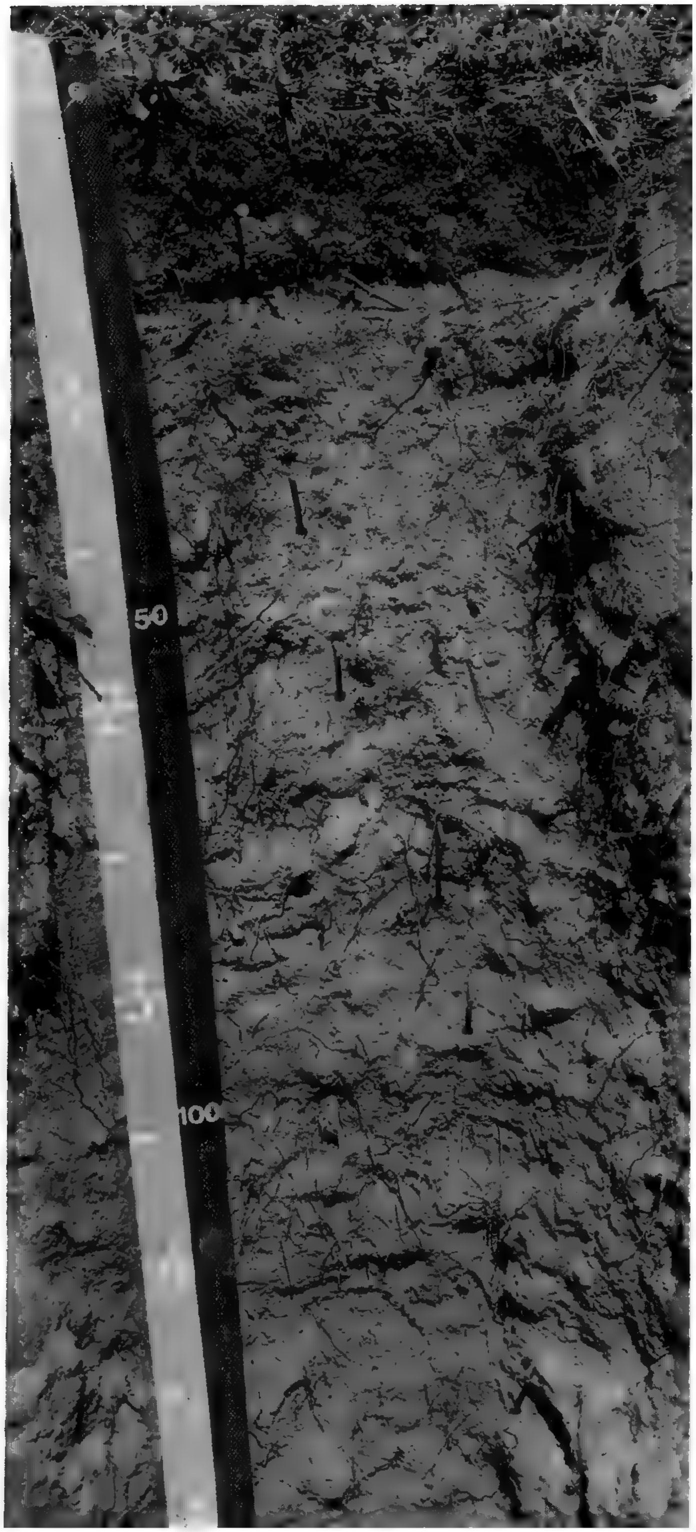

Figure 4.—Profile of Asta gravelly sandy loam, 5 to 15 percent slopes. Tape measure on right gives depth in centimeters, and that on left gives depth in feet.

A11—0 to 3 inches; dark brown (7.5YR 4/4) gravelly sandy loam, black (5YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 25 percent fine iron concretions and rounded pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt smooth boundary.

A12—3 to 6 inches; dark brown (7.5YR 4/4) gravelly sandy loam, dark reddish brown (5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent fine iron concretions and rounded pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt smooth boundary.

A3—6 to 13 inches; brown (7.5YR 5/4) gravelly sandy loam, dark reddish brown (5YR 3/4) moist; very weak medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent fine iron concretions and rounded pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; clear smooth boundary.

B1—13 to 20 inches; brown (7.5YR 5/4) loam, reddish brown (5YR 4/4) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; few very fine tubular pores; strongly acid; abrupt wavy boundary.

B21t—20 to 27 inches; brown (7.5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; common very fine vesicular pores and few very fine tubular pores; common thin clay films in pores and on peds; strongly acid; abrupt wavy boundary.

IIB22t—27 to 34 inches; strong brown (7.5YR 5/6) loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many medium roots and few very fine and fine roots; common very fine and fine tubular pores and few very fine vesicular pores; continuous thin clay films in pores and on peds; strongly acid; clear wavy boundary.

IIB23t—34 to 50 inches; strong brown (7.5YR 5/6) silt loam, reddish brown (5YR 4/4) moist; massive; hard, friable, sticky and plastic; many medium roots and few very fine and fine roots; common very fine and fine tubular pores and few very fine vesicular pores; continuous thin clay films in pores; 5 percent fine rounded pebbles 2 to 5 millimeters in diameter; strongly acid; clear wavy boundary.

IIB24t—50 to 60 inches; strong brown (7.5YR 5/6) silt loam, reddish brown (5YR 4/4) moist; massive; hard, friable, sticky and plastic; many medium roots

and few very fine and fine roots; common very fine and fine tubular pores and few very fine vesicular pores; few thick clay films on pebbles and many thin clay films in pores; 5 percent fine rounded pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt wavy boundary.

IIC—60 to 71 inches; strong brown (7.5YR 5/6, dry and moist) silt loam; massive; hard, friable, sticky and plastic; many medium roots and few very fine and fine roots; few very fine and fine tubular pores; weakly smeary; very strongly acid.

Depth to glacial outwash is more than 60 inches. Bulk density ranges from 0.6 to 1 gram per cubic centimeter to a depth of 10 to 20 inches. It is 0.85 gram per cubic centimeter or more to a depth of 10 to 14 inches.

The A1 horizon has value of 3 to 6 when dry and 2 to 5 when moist, chroma of 3, 4, or 6 when dry and 1 to 4 when moist, and hue of 10YR, 7.5YR, or 5YR. Reaction is very strongly acid to slightly acid. Texture is gravelly sandy loam or cobbly sandy loam. The horizon is 10 to 15 percent clay and 15 to 35 percent rock fragments. Thickness ranges from 3 to 8 inches. Base saturation ranges from 25 to 35 percent. The sodium fluoride reaction ranges from 9 to 10.

The B2t and IIB2t horizons have value of 3 to 7 when dry and 4 to 6 when moist, chroma of 2, 3, 4, or 6 when dry and 2, 3, 4, 6, or 8 when moist, and hue of 10YR, 7.5YR, or 5YR. Reaction is very strongly acid or strongly acid. Texture is loam, silt loam, cobbly loam, or cobbly silt loam. The horizon is 0 to 35 percent rock fragments. The weighted average clay content of the upper 20 to 30 inches of the argillic horizon ranges from 18 to 25 percent. Base saturation ranges from 25 to 35 percent. Bulk density of the upper 20 inches of the argillic horizon ranges from 1 gram to 1.2 grams per cubic centimeter.

Atter series

The Atter series consists of very deep, somewhat excessively drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 30 percent.

Typical pedon of Atter very cobbly sandy loam, 0 to 5 percent slopes; 265 feet south and 320 feet west of the northeast corner of sec. 36, T. 43 N., R. 10 W.

A11—0 to 9 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam, very dark gray (10YR 3/1) moist; massive; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine interstitial and tubular pores; 25 percent pebbles and 25 percent cobbles; slightly acid; abrupt smooth boundary.

A12—9 to 12 inches; pale brown (10YR 6/3) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots and many medium roots; few fine interstitial and tubular pores; 25 percent pebbles and 25 percent cobbles; slightly acid; abrupt wavy boundary.

AC—12 to 18 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots and many medium roots; common fine interstitial and tubular pores; 25 percent pebbles and 25 percent cobbles; slightly acid; abrupt wavy boundary.

C1—18 to 33 inches; pale brown (10YR 6/3) very cobbly loamy sand, dark brown (10YR 4/3) moist; single grain; loose; few very fine and fine roots and common medium roots; common fine interstitial pores; 25 percent pebbles and 25 percent cobbles; medium acid; abrupt wavy boundary.

C2—33 to 60 inches; light brownish gray (10YR 6/2) very cobbly sand, dark brown (10YR 4/2) moist; single grain; loose; common fine intersititial pores; 30 percent pebbles and 20 percent cobbles; medium acid.

Thickness of the solum ranges from 7 to 39 inches. Content of rock fragments ranges from 35 to 60 percent. The solum is 0 to 10 percent clay. Reaction is medium acid to neutral.

The A1 horizon has value of 4 to 6 when dry and 3 or 4 when moist, and it has chroma of 1 to 3 when dry. Texture is very cobbly sandy loam, very gravelly sandy loam, or very bouldery loamy fine sand. Organic matter content is less than 1 percent in the upper 7 inches of the horizon, and it decreases regularly with depth. Thickness of the A1 horizon ranges from 7 to 25 inches.

The C horizon has value of 4 to 6 when dry and 3 or 4 when moist, and it has chroma of 2 to 4. It is very cobbly or very bouldery sand or loamy sand and is 0 to 5 percent clay.

Avis series

The Avis series consists of very deep, somewhat excessively drained soils on mountains (fig. 5). These soils formed in volcanic ash. Slopes range from 5 to 50 percent.

Typical pedon of an Avis very stony sandy loam in an area of Avis-Oosen complex, 5 to 30 percent slopes; 2,150 feet south and 300 feet west of the northeast corner of sec. 21, T. 45 N., R. 3 W.

O1&O2—3 inches to 0; undecomposed and partially decomposed needles, twigs, bark, leaves, and other organic debris.

A11—0 to 6 inches; yellowish brown (10YR 5/4) very stony sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 5 percent pebbles, 10 percent cobbles, and 15 percent stones; neutral; abrupt smooth boundary.

Figure 5.—Profile of Avis very stony sandy loam in an area of Avis-Oosen complex, 5 to 30 percent slopes. Tape measure on right gives depth in centimeters, and that on left gives depth in feet.

A12—6 to 13 inches; yellowish brown (10YR 5/4) very stony sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 5 percent pebbles, 10 percent cobbles, and 15 percent stones; slightly acid; abrupt wavy boundary.

C1—13 to 34 inches; light yellowish brown (10YR 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine interstitial pores; 30 percent pebbles, 10 percent cobbles, and 2 percent stones; slightly acid; abrupt wavy boundary.

IIC2—34 to 47 inches; yellowish brown (10YR 5/4) very gravelly loamy sand, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; 30 percent pebbles, 10 percent cobbles, and 5 percent stones; slightly acid; abrupt wavy boundary.

IIC3—47 to 60 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 3/4) moist; single grain; loose; many very fine, fine, medium, and coarse roots; 30 percent pebbles, 10 percent cobbles, and 5 percent stones; medium acid; gradual wavy boundary.

IIC4—60 to 72 inches; yellowish brown (10YR 5/4) very gravelly sand, dark yellowish brown (10YR 3/4) moist; single grain; loose; 30 percent pebbles, 15 percent cobbles, and 5 percent stones; medium acid.

Depth to fractured lava flow material ranges from 60 to 80 inches. The profile is 0 to 5 percent clay. Base saturation ranges from 20 to 50 percent throughout the profile. The sodium fluoride reaction ranges from 10.9 at the surface to 9.9 at a depth of 40 to 72 inches. The 10- to 40-inch control section averages 35 to 70 percent rock fragments.

The A horizon has value of 5 or 6 when dry and chroma of 2 to 4 when dry or moist. Reaction is medium acid to neutral. Content of rock fragments ranges from 15 to 35 percent. Thickness ranges from 9 to 14 inches. Where the A horizon is dark-colored, it lacks the thickness to qualify it as a mollic epipedon.

The C horizon has value of 5 or 6 when dry and 3 to 5 when moist, chroma of 2 to 4 when dry and 3 or 4 when moist, and hue of 10YR or 7.5YR. Reaction is medium acid or slightly acid. The C horizon is very gravelly loamy fine sand or very gravelly loamy sand. It is 35 to 60 percent rock fragments.

The IIC horizon has value of 5 or 6 when dry and 3 to 5 when moist, and it has chroma of 3 or 4. It is very gravelly loamy fine sand, very gravelly loamy sand, or very gravelly sand and is 35 to 60 percent rock fragments.

Bogus series

The Bogus series consists of very deep, well drained soils on mountains. These soils formed in residuum derived from tuff. Slopes range from 15 to 50 percent.

Typical pedon of Bogus stony loam, 15 to 50 percent slopes; 600 feet west and 1,375 feet north of the southeast corner of sec. 16, T. 46 N., R. 4 W.

O1&O2—1 inch to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) stony loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; 10 percent stones, 2 percent cobbles, and 10 percent pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 11 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; strong medium granular structure; hard, friable, sticky and plastic; many very fine, fine, medium, and coarse roots; few fine tubular pores; 2 percent cobbles and 5 percent pebbles; slightly acid; abrupt smooth boundary.

B1t—11 to 20 inches; grayish brown (10YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; strong fine angular blocky structure; very hard, firm, sticky and very plastic; common very fine and fine roots and many medium and coarse roots; common very fine tubular pores and fine vesicular pores; few thin clay films on peds and lining pores; 10 percent cobbles and 5 percent pebbles; medium acid; abrupt wavy boundary.

B21t—20 to 29 inches; yellowish brown (10YR 5/4) heavy clay loam, dark yellowish brown (10YR 4/4) moist; strong medium angular blocky structure; extremely hard, very firm, sticky and very plastic; few very fine and fine roots and many medium and coarse roots; few very fine tubular pores; few moderately thick clay films on peds and common thin clay films on peds and in pores; 10 percent cobbles and 5 percent pebbles; medium acid; clear wavy boundary.

B22t—29 to 39 inches; yellowish brown (10YR 5/4 and 5/6) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots and many medium roots; few very fine tubular pores; continous thick clay films on peds and lining pores; 5 percent cobbles; strongly acid; clear wavy boundary.

B23t—39 to 53 inches; yellowish brown (10YR 5/4) clay, dark brown (10YR 4/3) when moist and when rubbed; dark yellowish brown (10YR 4/4) ped faces; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots and common medium roots; few very fine tubular pores; pressure faces or continuous thick clay films on ped faces; common large slickensides; very strongly acid; clear wavy boundary.

B3t—53 to 62 inches; yellowish brown (10YR 5/4) sandy clay, dark yellowish brown (10YR 4/4) when moist and rubbed; strong medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots and common medium roots; few very fine discontinuous tubular pores; continuous thick clay films or pressure faces; common large slickensides; very strongly acid.

Cr—62 inches; weathered tuff.

Few to many stones are on the surface. Depth to weathered tuff ranges from 60 to 80 inches. Organic matter content is 1 to 4 percent to a depth of 20 to 25 inches, and it decreases regularly with depth. Base saturation is 50 to 75 percent in some or all of the A horizon and in the upper part of the Bt horizon.

The A horizon has value of 3 or 4 when dry and 2 or 3 when moist, chroma of 1 to 3, and hue of 10YR and 7.5YR. Reaction is medium acid or slightly acid. The A horizon is stony loam or very stony loam. The A1 horizon is 25 to 27 percent clay and 15 to 35 percent rock fragments. Thickness ranges from 3 to 6 inches. The A12 horizon is 27 to 35 percent clay and 0 to 15 percent rock fragments. Thickness ranges from 8 to 10 inches.

The B2t horizon has value of 4 to 7 when dry and 3 to 6 when moist, chroma of 4 or 6 when dry and 3, 4, or 6 when moist, and hue of 10YR or 2.5Y. Reaction is very strongly acid to medium acid. The B2t horizon is 35 to 60 percent clay and 5 to 15 percent rock fragments.

Bonnet series

The Bonnet series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 5 percent.

Typical pedon of Bonnet gravelly loam, 0 to 2 percent slopes; 800 feet south and 1,050 feet east of the northwest corner of sec. 28, T. 43 N., R. 6 W.

Ap1—0 to 4 inches; grayish brown (2.5Y 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 30 percent fine and medium pebbles; moderately alkaline; abrupt smooth boundary.

Ap2—4 to 14 inches; grayish brown (2.5Y 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; 30 percent fine and medium pebbles; moderately alkaline; clear smooth boundary.

AC—14 to 26 inches; grayish brown (2.5Y 5/2) very gravelly loam, dark brown (10YR 3/3) moist;

massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; 45 percent fine and medium pebbles; moderately alkaline; clear smooth boundary.

C1ca—26 to 35 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 60 percent fine and medium pebbles; slightly effervescent with disseminated lime, strongly effervescent with carbonate accumulations on the undersides of about 50 percent of the pebbles; strongly alkaline; abrupt smooth boundary.

C2ca—35 to 46 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; 60 percent fine and medium pebbles; slightly effervescent with disseminated lime, violently effervescent with carbonate accumulations on the undersides of about 65 percent of the pebbles; moderately alkaline; clear smooth boundary.

C3ca—46 to 61 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; 80 percent fine and medium pebbles; slightly effervescent with disseminated lime, violently effervescent with carbonate accumulations on the undersides of about 85 percent of the pebbles and on most of the larger rock fragments; moderately alkaline.

Depth to lime ranges from 20 to 30 inches. The solum is 21 to 32 inches thick. It is 10 to 18 percent clay.

The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, chroma of 2 or 3 when dry and 1 to 3 when moist, and hue of 2.5Y or 10YR. Reaction is slightly acid to moderately alkaline. Texture is loam or gravelly loam. Organic matter content of the upper 10 to 14 inches ranges from 1 to 2 percent. Thickness of the A horizon ranges from 11 to 18 inches.

The C horizon has value of 5 to 7 when dry, chroma of 3 or 4, and hue of 2.5Y or 10YR. Reaction is moderately alkaline or strongly alkaline. The upper part of the C horizon is 10 to 18 percent clay and 35 to 60 percent rock fragments. The lower part is very gravelly or extremely gravelly loamy sand, sandy loam, or loam. It is 5 to 15 percent clay and 60 to 80 percent rock fragments.

Boomer series

The Boomer series consists of deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 5 to 70 percent.

Typical pedon of a Boomer gravelly loam in an area of Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes; 2,450 feet north and 650 feet west of the southeast corner of sec. 3, T. 44 N., R. 9 W.

O1—1 inch to 0; needles, leaves, bark, twigs, and other organic debris.

A11—0 to 3 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; 20 percent pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 10 inches; brown (7.5YR 5/4) gravelly loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots, common medium roots, and many coarse roots; many very fine interstitial pores and many fine tubular pores; 20 percent pebbles; slightly acid; clear wavy boundary.

B21t—10 to 15 inches; yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots and many coarse roots; many fine interstitial and tubular pores; common thin clay films on peds and lining pores; 20 percent pebbles; slightly acid; clear smooth boundary.

B22t—15 to 31 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine, fine, and medium roots; common fine interstitial and tubular pores; many moderately thick clay films on peds and lining pores; 20 percent pebbles; slightly acid; clear smooth boundary.

B23t—31 to 40 inches; yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable, very sticky and plastic; few very fine, fine, and medium roots; common fine interstitial pores and few fine tubular pores; many moderately thick clay films on peds and lining pores; 25 percent pebbles; medium acid; gradual smooth boundary.

B3t—40 to 53 inches; yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable, very sticky and plastic; few very fine, fine, and medium roots; few fine tubular pores and common fine interstitial pores; 25 percent pebbles; medium acid; gradual smooth boundary.

Cr—53 inches; weathered metamorphosed basic igneous rock.

Depth to weathered rock ranges from 40 to 60 inches. The profile is 5 to 35 percent rock fragments.

The A1 horizon has value of 5 or 6 when dry and 3 to 5 when moist, and it has hue of 10YR, 7.5YR, or 5YR. Reaction is neutral to medium acid. Texture is gravelly loam or loam. The A1 horizon is 18 to 27 percent clay. It ranges from 5 to 10 inches in thickness.

The B2t horizon has value of 4 to 6 when dry and 4 or 5 when moist, and it has chroma of 4, 6, or 8 when dry

and 4 or 6 when moist. Reaction is strongly acid to slightly acid. Texture is clay loam or gravelly clay loam. The B2t horizon is 25 to 35 percent clay.

Boomer Variant

The Boomer Variant consists of very deep, well drained soils on mountains. These soils formed in residuum derived from sandstone. Slope ranges from 5 to 70 percent.

Typical pedon of Boomer Variant sandy loam, 30 to 50 percent slopes; 1,750 feet east and 1,200 feet south of the northwest corner of sec. 34, T. 48 N., R. 7 W.

O1&O2—1 inch to 0; undecomposed and partially decomposed organic debris.

A11—0 to 2 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots and common medium roots; many interstitial pores and common fine tubular pores; medium acid; abrupt smooth boundary.

A12—2 to 6 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 3/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common fine and medium roots; common very fine tubular pores and few fine tubular pores; medium acid; abrupt smooth boundary.

A3—6 to 10 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many random interstitial pores and few fine tubular pores; few thin clay films in pores; strongly acid; clear smooth boundary.

B1t—10 to 25 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine, medium, and coarse roots; many very fine and fine tubular pores; common thick and moderately thick clay films in pores and few thin clay films on peds; strongly acid; clear smooth boundary.

B21t—25 to 36 inches; yellowish brown (10YR 5/6) sandy clay loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, slightly firm, sticky and very plastic; many medium and coarse roots and common fine roots; common fine tubular pores; common thick clay films and many moderately thick clay films on peds and in pores; strongly acid; gradual wavy boundary.

B22t—36 to 50 inches; yellowish brown (10YR 5/6) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; many medium roots and common fine roots; many fine tubular pores; many moderately thick clay films in pores and on peds; strongly acid; gradual wavy boundary.

B23t—50 to 70 inches; yellowish brown (10YR 5/6) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; many medium roots and common fine roots; many fine tubular pores; many moderately thick clay films in pores and on peds; medium acid; clear smooth boundary.

Cr—70 inches; weathered sandstone.

Depth to sandstone ranges from 60 to 80 inches. The profile is 0 to 35 percent rock fragments. A few stones are on the surface.

The A1 horizon has value of 4 to 6 when dry and 2 to 4 when moist, chroma of 3 to 5, and hue of 7.5YR or 10YR. Where it is dark-colored, it lacks the organic matter content and thickness to qualify as a mollic epipedon. Reaction of the A1 horizon is medium acid or slightly acid. The horizon is sandy loam or stony sandy loam and is 5 to 18 percent clay. Thickness ranges from 5 to 13 inches.

The B2t horizon has value of 4 to 6 when dry and 3 to 5 when moist, and it has chroma of 4 or 6. It is sandy clay loam, loam, or sandy loam and is 18 to 25 percent clay. The B2t horizon is stony in places. Reaction is strongly acid to slightly acid.

Chaix series

The Chaix series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from granitic rock. Slope ranges from 5 to 70 percent.

Typical pedon of a Chaix gravelly coarse sandy loam in an area of Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes; 1,000 feet east and 500 feet south of the northwest corner of sec. 18, T. 42 N., R. 9 W.

O1—1 inch to 0; leaves, needles, and twigs, some partially decomposed.

A1—0 to 4 inches; brown (10YR 5/3) gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial and tubular pores; 20 percent pebbles; slightly acid; abrupt smooth boundary.

B2t—4 to 28 inches; very pale brown (10YR 7/3) gravelly coarse sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; many very fine interstitial pores and few fine tubular pores; few thin clay films bridging mineral grains; 20 percent pebbles; medium acid; clear wavy boundary.

C—28 to 34 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, yellowish brown (10YR

5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few coarse roots; many fine interstitial pores; 20 percent pebbles; strongly acid; clear wavy boundary.

Cr—34 inches; weathered granite.

Depth to weathered granite ranges from 20 to 40 inches. Thickness of the solum ranges from 20 to 30 inches. The profile is 15 to 35 percent rock fragments.

The A1 horizon has value of 4 to 6 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. Reaction is medium acid or slightly acid. Thickness ranges from 3 to 6 inches.

The B2t horizon has value of 6 or 7 when dry and 3 to 5 when moist, and it has chroma of 3 or 4. Reaction is strongly acid or medium acid. The B2t horizon has 1 to 2 percent more clay than the A horizon.

Chawanakee series

The Chawanakee series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in residuum derived from granitic rock. Slope ranges from 5 to 70 percent.

Typical pedon of a Chawanakee gravelly coarse sandy loam in an area of Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes; 1,720 feet north and 2,630 feet west of the southeast corner of sec. 18, T. 42 N., R. 9 W.

O1—1 inch to 0; leaves, needles, and twigs, some partially decomposed.

A1—0 to 4 inches; light brownish gray (10YR 6/2) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial and tubular pores; 25 percent pebbles; medium acid; abrupt smooth boundary.

B2t—4 to 16 inches; pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 5/3) moist; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine interstitial and tubular pores; common thin clay films bridging mineral grains; 25 percent pebbles; medium acid; clear wavy boundary.

Cr—16 inches; weathered granite.

Depth to weathered granite ranges from 10 to 20 inches. The profile is 15 to 35 percent rock fragments. Reaction of the solum is medium acid or slightly acid.

The A1 horizon has value of 5 or 6 when dry and 2 to 4 when moist, and it has chroma of 2 or 3. Thickness ranges from 2 to 5 inches.

The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 2 or 3.

Copsey series

The Copsey series consists of very deep, poorly drained soils on alluvial fans. These soils have formed in alluvium derived from serpentine rock. Slope ranges from 0 to 9 percent.

Typical pedon of Copsey clay, 0 to 9 percent slopes; 1,080 feet north and 10 feet west of the southeast corner of sec. 31, T. 42 N., R. 5 W.

A11—0 to 3 inches; very dark brown (10YR 2/2) clay, black (10YR 2/1) moist; weak fine subangular blocky structure; slightly hard, slightly firm, sticky and plastic; many very fine and fine roots; 5 percent fine pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 18 inches; black (10YR 2/1) clay, black (10YR 2/1) moist; weak fine subangular blocky structure; slightly hard, slightly firm, sticky and plastic; many very fine and fine roots; 5 percent fine pebbles; slightly acid; abrupt smooth boundary.

AC—18 to 23 inches; very dark gray (10YR 3/1) gravelly clay, black (N 2/0) moist; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine tubular pores; 20 percent fine pebbles; mildly alkaline; gradual smooth boundary.

C1—23 to 31 inches; dark gray (10YR 4/1) gravelly clay, very dark gray (10YR 3/1) moist; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; common medium roots and few very fine and fine roots; 20 percent fine and medium pebbles; mildly alkaline; clear wavy boundary.

C2—31 to 37 inches; dark grayish brown (10YR 4/2) gravelly clay, very dark brown (10YR 2/2) moist, dark gray (N 4/0) moist and rubbed; strong medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine and fine roots; few fine tubular pores; 25 percent very fine, fine, and medium pebbles and 2 percent cobbles; mildly alkaline; clear wavy boundary.

C3—37 to 60 inches; dark grayish brown (10YR 4/2) gravelly clay, black (2.5Y 2/2) moist, dark gray (10YR 4/1) moist and rubbed; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; 20 percent fine pebbles and 3 percent cobbles; mildly alkaline.

Thickness of the solum ranges from 17 to 30 inches. Cracks 1 to 3 centimeters extend to a depth of 20 to 30 inches when the soils are dry. A water table is at a depth of 6 to 18 inches from December through March and at a depth of 18 to 40 inches the rest of the year.

The A1 horizon has value of 2 to 4 when dry and 2 or 3 when moist, chroma of 0 to 2 when dry, and hue of 2.5Y, 10YR, or neutral. Reaction is slightly acid or

neutral. The A1 horizon is clay, gravelly clay, or cobbly clay. It is 40 to 60 percent clay and 5 to 35 percent rock fragments. Organic matter content ranges from 2 to 6 percent in the upper 18 inches.

The C horizon has hue of 5Y, 2.5Y, 10YR, or neutral. Reaction is slightly acid to mildly alkaline. The C horizon is gravelly or cobbly clay. It is 40 to 60 percent clay and 15 to 35 percent rock fragments.

Deetz series

The Deetz series consists of very deep, somewhat excessively drained soils on glacial outwash fans (fig. 6). These soils formed in alluvium derived from extrusive igneous rock and ash. Slope ranges from 0 to 30 percent.

Typical pedon of Deetz gravelly loamy sand, 5 to 15 percent slopes; 1,600 feet south and 1,200 feet east of the northwest corner of sec. 19, T. 41 N., R. 4 W.

O1&O2—1/2 inch to 0; undecomposed and partially decomposed leaves, needles, twigs, bark, and other organic debris.

A11—0 to 1 1/2 inches; very dark grayish brown (10YR 3/2) gravelly loamy sand, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; 15 percent pebbles; medium acid; abrupt smooth boundary.

A12—1 1/2 to 4 inches; dark brown (10YR 4/3) gravelly loamy sand, very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 15 percent pebbles; medium acid; abrupt smooth boundary.

A13—4 to 7 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 15 percent pebbles; medium acid; clear smooth boundary.

C1—7 to 12 inches; pale brown (10YR 6/3) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 15 percent pebbles; medium acid; clear smooth boundary.

C2—12 to 18 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many medium roots and common very fine and fine roots; 15 percent pebbles; medium acid; abrupt wavy boundary.

C3—18 to 28 inches; pale brown (10YR 6/3) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many medium roots and common very fine and fine roots; 23 percent pebbles and 2 percent cobbles; medium acid; clear wavy boundary.

C4—28 to 38 inches; pale brown (10YR 6/3) and very pale brown (10YR 7/3) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very

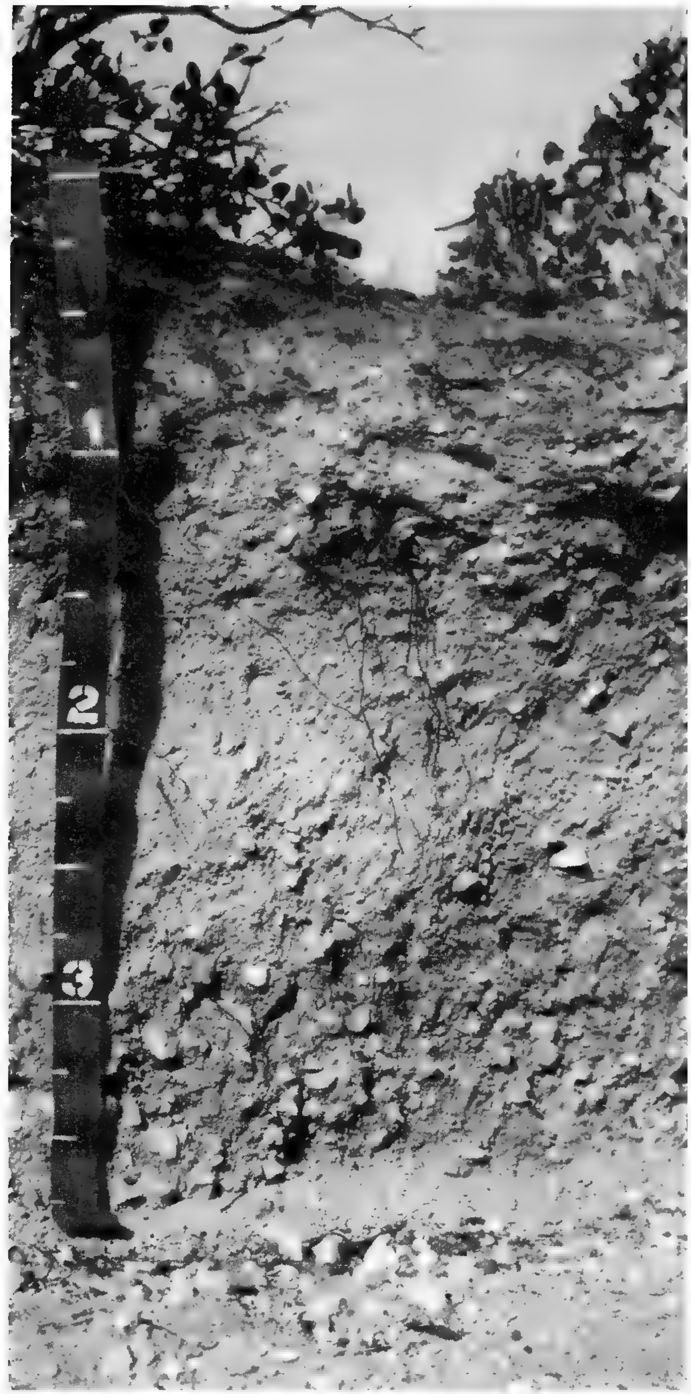

Figure 6.—Typical profile of Deetz gravelly loamy sand, 0 to 5 percent slopes. Tape measure gives depth in feet.

fine and fine roots; 30 percent pebbles and 2 percent cobbles; medium acid; abrupt wavy boundary.

IIC5—38 to 53 inches; pale brown (10YR 6/3) very gravelly sand, strong brown (7.5YR 4/6) moist; single grain; loose; many medium roots and few very fine and fine roots; 38 percent pebbles and 7 percent cobbles; medium acid; abrupt wavy boundary.

IIIC6—53 to 65 inches; gray (10YR 6/1) and light gray (10YR 7/1) very gravelly sand; single grain; loose; many medium roots and few very fine and fine roots; 48 percent pebbles and 2 percent cobbles; medium acid.

Thickness of the solum ranges from 5 to 12 inches. Reaction is strongly acid or medium acid. The weighted average of rock fragments in the 10- to 40-inch control section is less than 35 percent. The A horizon is too thin or the base saturation is too low to qualify it as a mollic epipedon. Base saturation ranges from 40 to 70 percent in the A horizon and from 15 to 50 percent between depths of 10 and 40 inches. Base saturation commonly decreases with depth. The sodium fluoride reaction ranges from 9.6 to 10.7 throughout the profile. In places a few stones are on the surface.

The A horizon is gravelly loamy sand or stony loamy sand. It is 0 to 5 percent clay and 15 to 35 percent rock fragments.

The C horizon has value of 4 to 6 when moist, and it has chroma of 1 to 4 when dry and 2 to 6 when moist. It is stratified loamy sand or sand. This horizon is 0 to 2 percent clay. It is 5 to 35 percent gravel and cobbles in the upper 40 inches and 35 to 60 percent below a depth of 40 inches.

Delaney series

The Delaney series consists of deep or very deep, somewhat excessively drained soils on glacial outwash fans. These soils formed in alluvium weathered from extrusive igneous rock and volcanic ash. Slope ranges from 0 to 15 percent.

Typical pedon of Delaney sand, 0 to 9 percent slopes; 550 feet east and 10 feet north of the southwest corner of sec. 30, T. 43 N., R. 4 W.

A11—0 to 5 inches; grayish brown (10YR 5/2) sand, very dark grayish brown (10YR 3/2) moist; very weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots and many medium roots; few fine tubular pores and many fine interstitial pores; medium acid; abrupt smooth boundary.

A12—5 to 9 inches; grayish brown (10YR 5/2) sand, dark brown (10YR 3/3) moist; weak thick platy structure, massive in some parts; soft, very friable, nonsticky and nonplastic; common fine and very fine roots and many medium roots; few fine tubular pores and many fine interstitial pores; medium acid; abrupt smooth boundary.

AC—9 to 13 inches; grayish brown (10YR 5/2) sand, olive brown (2.5Y 3/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots and many medium roots; few fine tubular pores and many fine interstitial pores; medium acid; clear smooth boundary.

C1—13 to 23 inches; pale brown (10YR 6/3) sand, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots and many medium roots; few fine tubular pores and many fine interstitial pores; medium acid; abrupt smooth boundary.

C2—23 to 32 inches; light gray (10YR 7/2) sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots and common medium roots; many fine interstitial pores; medium acid; clear smooth boundary.

C3—32 to 41 inches; very pale brown (10YR 7/3) sand, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots and common medium roots; many fine interstitial pores; medium acid; clear smooth boundary.

C4—41 to 68 inches; white (10YR 8/2) sand, dark grayish brown (10YR 4/2) moist; single grain; loose; few fine roots and common medium roots; medium acid.

In a few areas, stones are on the surface. Depth to bedrock or to a strongly contrasting layer of alluvium ranges from 40 to 80 inches. Reaction is medium acid to neutral throughout the profile. Base saturation is more than 60 percent in some parts of the upper 10 to 30 inches.

The A1 horizon has value of 5 to 7 when dry and 3 or 4 when moist, chroma of 2 or 3, and hue of 10YR or 2.5Y. It is sandy loam, sand, gravelly sand, or stony sand. The horizon is 0 to 5 percent clay and 5 to 35 percent rock fragments. Organic matter content ranges from 0.5 to 1.0 percent in the A horizon. Thickness of the A horizon ranges from 8 to 11 inches.

The C horizon has value of 6 to 8 when dry and 3 to 5 when moist, chroma of 2 to 4 when dry or moist, and hue of 10YR or 2.5Y. The horizon is 0 to 5 percent clay and 5 to 35 percent rock fragments. It is sand or loamy sand. The sand is gravelly, cobbly, or stony in places, and the loamy sand is gravelly in places. In some pedons very gravelly sand is below a depth of 40 inches.

Delaney Variant

The Delaney Variant consists of very deep, well drained soils on glacial outwash fans. These soils formed in glaciofluvial deposits derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Typical pedon of Delaney Variant silt, 0 to 2 percent slopes; 1,100 feet north and 500 feet east of the southwest corner of sec. 22, T. 43 N., R. 4 W.

A1—0 to 7 inches; gray (10YR 6/1) silt, dark gray (10YR 4/1) moist; moderate medium platy structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

C1—7 to 14 inches; gray (10YR 6/1) loamy fine sand, very dark grayish brown (10YR 3/2) moist; massive and very weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; few interstitial pores; neutral; abrupt smooth boundary.

IIC2—14 to 22 inches; light gray (10YR 7/2) silt, dark grayish brown (10YR 4/2) moist; very weak thick platy structure and massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and medium discontinuous tubular and vesicular pores; neutral; abrupt smooth boundary.

IIIC3—22 to 34 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; few interstitial pores; 10 percent pumice pebbles; neutral; clear wavy boundary.

IVC4—34 to 53 inches; light gray (10YR 7/2) sandy loam, dark brown (10YR 3/3) moist; massive; soft, friable, nonsticky and nonplastic; common fine and medium roots; common interstitial pores; neutral; clear wavy boundary.

VC5—53 to 60 inches; light gray (10YR 7/2) coarse sand, dark brown (10YR 3/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few interstitial pores; mildly alkaline.

Thickness of the solum ranges from 6 to 8 inches. The textural control section is stratified layers of silt, loamy fine sand, loamy sand, and sandy loam. Clay content ranges from 0 to 5 percent throughout the profile.

The A1 horizon has value of 5 to 7 when dry and 3 or 4 when moist, chroma of 1 or 2, and hue of 2.5Y or 10YR. Reaction is slightly acid or neutral. Content of rock fragments ranges from 0 to 5 percent. Organic matter content ranges from 0.3 to 0.6 percent.

The C horizon has value of 5 to 8 when dry, chroma of 1 to 4, and hue of 2.5Y or 10YR. Reaction is slightly acid or neutral in the upper part of the C horizon and neutral or mildly alkaline in the lower part. Content of rock fragments ranges from 0 to 10 percent.

Deven series

The Deven series consists of shallow, well drained soils on plateaus. These soils formed in residuum derived from andesitic rock. Slope ranges from 0 to 30 percent.

Typical pedon of a Deven loam in an area of Deven-Rubble land complex, 0 to 30 percent slopes; 2,280 feet south and 1,550 feet east of the northwest corner of sec. 20, T. 48 N., R. 4 W.

A1—0 to 5 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; 2 percent pebbles; slightly acid; clear smooth boundary.

B21t—5 to 12 inches; dark brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; many moderately thick clay films on peds and lining pores; 2 percent pebbles; neutral; clear smooth boundary.

B22t—12 to 17 inches; dark brown (10YR 4/3) clay, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; continuous moderately thick clay films on peds and lining pores; 10 percent pebbles and cobbles; mildly alkaline; abrupt wavy boundary.

R—17 inches; hard andesite.

Depth to andesitic rock ranges from 10 to 20 inches. Reaction is slightly acid to mildly alkaline.

The A1 horizon has value of 4 or 5 when dry and chroma of 2 or 3 when dry. Organic matter content ranges from 1 to 3 percent in the upper 7 inches. Content of rock fragments ranges from 0 to 10 percent. Thickness ranges from 1 to 5 inches.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 2 or 3. It is 35 to 50 percent clay and contains at least 8 percent more clay than the A horizon. Content of rock fragments ranges from 0 to 15 percent.

Diyou series

The Diyou series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in mixed alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Diyou loam, drained; 1,830 feet east and 250 feet north of the southwest corner of sec. 13, T. 41 N., R. 9 W.

A1—0 to 11 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; common fine and very fine tubular pores; mildly alkaline; clear smooth boundary.

C1t—11 to 15 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common

medium roots; common medium tubular pores; mildly alkaline; clear smooth boundary.

IIAb—15 to 36 inches; gray (5Y 5/1) sandy clay loam, dark gray (5Y 4/1) moist; common fine prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6, moist) mottles; massive; very hard, firm, sticky and plastic; common fine roots; common fine and very fine tubular pores; saturated with water at a depth of 30 inches; mildly alkaline; clear smooth boundary.

IIC2—36 to 47 inches; light olive gray (5Y 6/2) clay loam, dark olive gray (5Y 3/2) moist; common prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6, moist) mottles; massive; very hard, firm, sticky and very plastic; saturated with water; mildly alkaline; clear smooth boundary.

IIC3—47 to 60 inches; light olive gray (5Y 6/2) sandy loam, dark olive gray (5Y 3/2) moist; massive; hard, very friable, nonsticky and nonplastic; free water; mildly alkaline.

The textural control section is stratified sandy loam, loam, sandy clay loam, and clay loam. It averages 18 to 25 percent clay. Some pedons do not have a buried A horizon. The profile is 0 to 15 percent rock fragments. Reaction is neutral or mildly alkaline. Some of these soils are artificially drained. In some pedons, peat is at a depth of 40 to 60 inches. Except where the soil is drained, a water table is at a depth of 24 to 36 inches from February through June, and it fluctuates between depths of 24 and 60 inches from July through January.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 1 or 2. Thickness ranges from 10 to 12 inches. Organic matter content ranges from 2 to 5 percent.

The C horizon has value of 5 or 6 when dry and chroma of 2 or 3.

Dotta series

The Dotta series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 9 percent.

Typical pedon of Dotta loam, 0 to 2 percent slopes; 600 feet east and 200 feet south of the northwest corner of sec. 18, T. 44 N., R. 4 W.

A1p—0 to 7 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; few fine vesicular pores; 10 percent fine and medium pebbles; slightly acid; abrupt smooth boundary.

A12—7 to 15 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots; few fine tubular and vesicular pores; 10 percent fine and medium pebbles; slightly acid; clear smooth boundary.

B2t—15 to 31 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist, weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; few fine and very fine roots; few medium, fine, and very fine tubular pores; few thin clay films on peds, lining pores, and bridging mineral grains; 10 percent pebbles; slightly acid; clear smooth boundary.

B3—31 to 52 inches; dark brown (10YR 4/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine and very fine roots; common medium, fine, and very fine tubular pores; few thin clay films in pores and many clay bridges between mineral grains; 10 percent pebbles; slightly acid; abrupt smooth boundary.

C—52 to 62 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many medium and fine interstitial pores; slightly acid.

Thickness of the solum ranges from 37 to 56 inches. The profile is 0 to 35 percent rock fragments. Organic matter content ranges from 1 to 3 percent in the upper 20 inches or more, and it decreases regularly with depth.

The A1 horizon has value of 3 to 5 when dry, chroma of 1 to 3 when dry and 1 or 2 when moist, and hue of 10YR or 7.5YR. It is loam or gravelly loam and is 10 to 25 percent clay. Thickness ranges from 10 to 16 inches.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, chroma of 2 or 3, and hue of 10YR or 7.5YR. Reaction is medium acid or slightly acid. The B2t horizon is clay loam or gravelly clay loam. It is 27 to 30 percent clay and 0 to 35 percent rock fragments.

The C horizon is medium acid or slightly acid. It is sandy clay loam or loam and is gravelly in some pedons. The C horizon is 20 to 27 percent clay and 0 to 35 percent rock fragments.

Dubakella series

The Dubakella series consists of moderately deep, well drained soils on mountains (fig. 7). These soils formed in residuum derived from serpentine. Slope ranges from 5 to 50 percent.

Typical pedon of a Dubakella stony loam in an area of Dubakella-Ipish complex, 5 to 30 percent slopes; 1,500 feet west and 2,480 feet south of the northeast corner of sec. 1, T. 44 N., R. 8 W.

O1&O2—2 inches to 0; undecomposed and partially decomposed needles, twigs, bark, leaves, and other organic debris.

A11—0 to 2 inches; pale brown (10YR 6/3) stony loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure parting to moderate fine

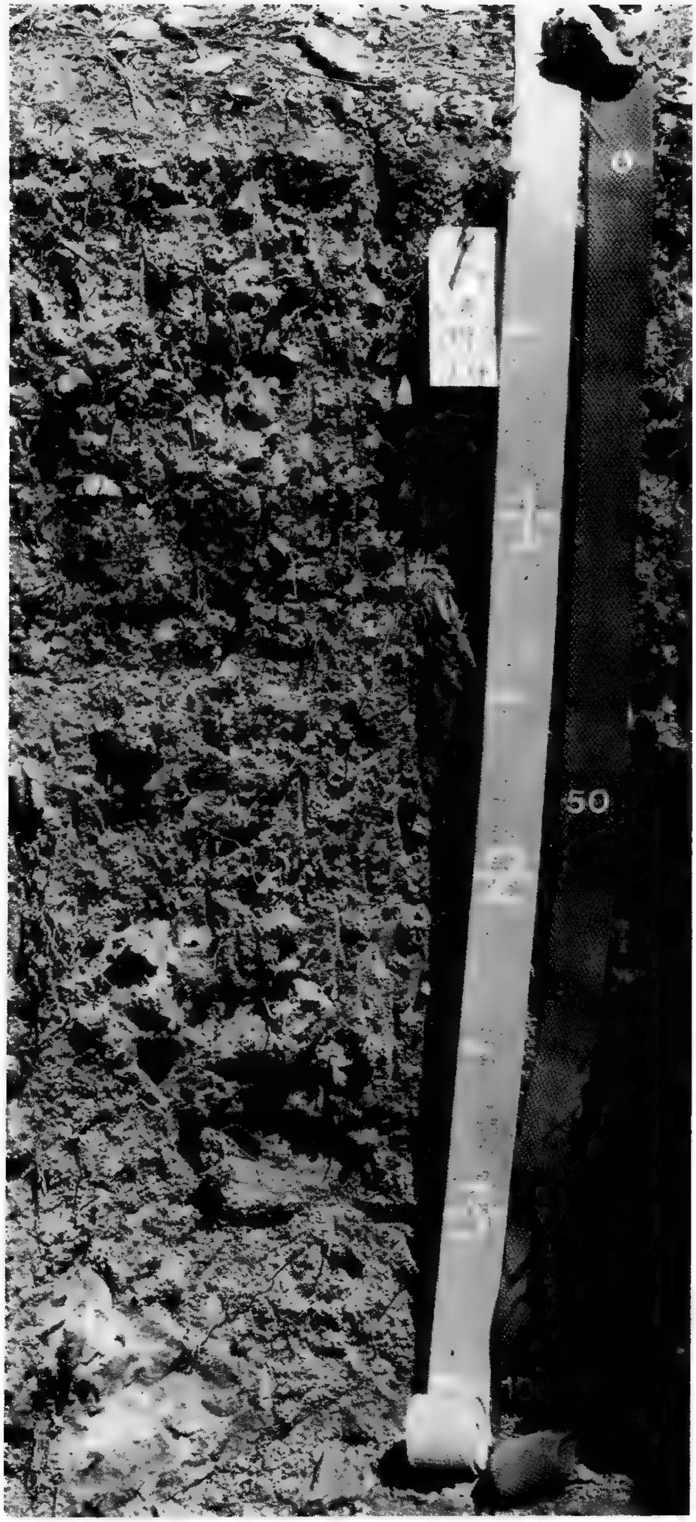

Figure 7.—Typical profile of a Dubakella stony loam in an area of Dubakella-Ipish complex, 5 to 30 percent slopes. Tape measure on right gives depth in centimeters, and that on left gives depth in feet.

subangular blocky; slightly hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; few fine tubular pores; 25 percent pebbles, cobbles, and stones; medium acid; abrupt smooth boundary.

A12—2 to 5 inches; pale brown (10YR 6/3) stony loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; few fine tubular pores; 35 percent pebbles, cobbles, and stones; medium acid; abrupt smooth boundary.

A3—5 to 11 inches; pale brown (10YR 6/3) stony loam, dark brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; few very fine tubular pores; 30 percent pebbles, cobbles, and stones; medium acid; clear smooth boundary.

B21t—11 to 15 inches; brown (7.5YR 5/4) very gravelly clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots and few very fine and fine roots; few very fine tubular pores; many thin clay films lining pores and on peds; 35 percent pebbles, cobbles, and stones; slightly acid; clear smooth boundary.

B22t—15 to 26 inches; brown (7.5YR 5/4) very gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; many medium and coarse roots and few very fine and fine roots; few very fine tubular pores; few thin clay films and common moderately thick and thick clay films lining pores and on peds; 40 percent pebbles, cobbles, and stones; slightly acid; clear smooth boundary.

B23t—26 to 36 inches; brown (7.5YR 5/4) very gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; many medium and coarse roots and few very fine and fine roots; few very fine tubular pores; few thick and thin clay films and many moderately thick clay films lining pores and on peds; 40 percent pebbles, cobbles, and stones; slightly acid; gradual wavy boundary.

R—36 inches; highly fractured serpentine.

Depth to serpentine ranges from 20 to 40 inches. A few stones are on the surface in places.

The A1 horizon has value of 3 or 4 when moist, chroma of 3 or 4 when dry and 2 or 3 when moist, and hue of 10YR or 7.5YR. Reaction is medium acid to neutral. Content of rock fragments is 15 to 35 percent. Thickness ranges from 8 to 12 inches.

The B2t horizon has value of 4 or 5 when dry and chroma of 3 or 4 when dry. Reaction is slightly acid or neutral. The B2t horizon is very gravelly clay or very gravelly clay loam. It is 35 to 50 percent clay and

contains at least 8 percent more clay than the A horizon. Content of rock fragments ranges from 35 to 60 percent.

Duzel series

The Duzel series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 5 to 50 percent.

Typical pedon of a Duzel gravelly loam in an area of Duzel-Jilson-Facey complex, 15 to 50 percent slopes; 2,050 feet south and 900 feet east of the northwest corner of sec. 31, T. 46 N., R. 6 W.

A11—0 to 4 inches; dark brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common fine and very fine vesicular pores; 20 percent pebbles; slightly acid; abrupt smooth boundary.

A12—4 to 8 inches; dark brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many very fine, fine, and medium roots; common fine and very fine vesicular and tubular pores; 15 percent pebbles; slightly acid; abrupt smooth boundary.

A3—8 to 13 inches; dark brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many medium roots and common very fine and fine roots; few fine and very fine tubular pores; few thin clay films lining pores; 15 percent pebbles; medium acid; clear smooth boundary.

B21t—13 to 16 inches; dark brown (7.5YR 4/4) gravelly loam, dark reddish brown (5YR 3/3) moist; very weak medium prismatic structure parting to moderate medium subangular blocky; hard, slightly firm, sticky and plastic; many medium roots and common fine and very fine roots; few fine and very fine tubular pores; common thin clay films on peds and lining pores; 15 percent pebbles; medium acid; clear smooth boundary.

B22t—16 to 23 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; very weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; many coarse and medium roots and few very fine and fine roots; few very fine and fine tubular pores; few moderately thick clay films and common thin clay films on peds and lining pores; 15 percent pebbles; medium acid; clear smooth boundary.

B23t—23 to 30 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; many medium roots and few very fine and fine roots; few very fine and fine tubular pores; common thin clay films on peds; 15 percent pebbles; medium acid; abrupt wavy boundary.

B3t—30 to 38 inches; reddish brown (5YR 4/4) very gravelly clay loam, dark reddish brown (5YR 3/4) moist; massive; very hard, firm, sticky and very plastic; few fine and very fine roots; few very fine and fine tubular pores; many thick clay films on peds and pebbles; 45 percent pebbles and 10 percent cobbles; medium acid; abrupt wavy boundary.

Cr—38 inches; highly fractured greenstone.

Depth to weathered bedrock ranges from 20 to 40 inches. Base saturation ranges from 75 to 95 percent throughout the profile. Organic matter content ranges from 1 to 2 percent in the upper 13 inches of the profile.

The A horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 2 or 3 when dry and 1 to 3 when moist, and hue of 10YR or 7.5YR. Reaction is medium acid to neutral. The A horizon is 10 to 18 percent clay. Thickness ranges from 4 to 8 inches.

The B2t horizon has value of 3 to 5 when dry and 3 or 4 when moist, and it has hue of 10YR, 7.5YR, or 5YR. Reaction is medium acid to mildly alkaline. Texture is gravelly loam or gravelly clay loam. The B2t horizon is 18 to 35 percent clay.

Esro series

The Esro series consists of very deep, very poorly drained soils in basins. These soils formed in alluvium derived from extrusive igneous rock. Slope is 0 to 2 percent.

Typical pedon of Esro silt loam, drained; 600 feet south and 400 feet east of the northeast corner of sec. 21, T. 44 N., R. 3 W.

A11—0 to 7 inches; dark gray (10YR 4/1) silt loam, black (N 2/0) moist; moderate medium platy structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; few fine tubular pores; neutral; abrupt smooth boundary.

A12—7 to 14 inches; gray (N 5/0) silt loam, black (N 2/0) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, very sticky and plastic; many fine roots and common medium roots; common very fine tubular pores and few fine tubular pores; neutral; abrupt smooth boundary.

A13—14 to 32 inches; gray (10YR 5/1) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure; hard, slightly firm, very sticky and very plastic; few fine roots and many medium roots; common very fine and medium tubular pores and few fine tubular pores; neutral; abrupt wavy boundary.

C1g—32 to 43 inches; variegated gray (10YR 5/1, 6/1) silt loam, dark grayish brown (10YR 4/2) moist; common fine distinct light olive gray (5Y 6/2), olive gray (5Y 5/2), and greenish gray (5GY 6/1) mottles; moderate medium subangular blocky structure; hard, slightly firm, very sticky and plastic; few fine and medium roots; few fine tubular pores; neutral; abrupt wavy boundary.

C2g—43 to 46 inches; light gray (10YR 7/2) silt loam, olive gray (5Y 4/2) if rubbed or crushed when moist; faces of peds are black (N 2/0); many fine to large distinct pale yellow (2.5Y 7/4) mottles when moist, and many fine to large distinct light olive brown (2.5Y 5/4) and reddish brown (5YR 5/3) mottles when moist; massive; very hard, firm, very sticky and plastic; few fine roots; very few very fine pores; mildly alkaline; clear smooth boundary.

IIC3g—46 to 49 inches; very pale brown (10YR 7/3) sandy loam, dark brown (10YR 4/3) when crushed and moist; many fine to large distinct pale yellow (2.5Y 7/4) and yellow (2.5Y 7/6) mottles when moist and many fine to large distinct and prominent olive brown (2.5Y 4/4) and olive (5Y 5/4, 5/6) mottles when moist; massive; very hard, firm, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

IIIC4g—49 to 51 inches; light brownish gray (10YR 6/2) sandy clay loam, dark brown (10YR 4/3) when crushed and moist; many fine to coarse distinct pale yellow (2.5Y 7/4) mottles when moist, and many fine to coarse faint and distinct dark brown (10YR 3/3) and yellowish brown (10YR 5/6) mottles when moist; massive; hard, firm, sticky and slightly plastic; neutral; abrupt smooth boundary.

IVC5g—51 to 79 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (10YR 4/3) moist; many medium distinct yellowish brown (10YR 5/6, moist) mottles; massive; soft, very friable, nonsticky and nonplastic; neutral.

The textural control section is strata of silt loam, loam, silty clay loam, and clay loam. It averages 60 to 75 percent silt and very fine sand and 18 to 30 percent clay. Where the soils are not drained, the water table is at a depth of 0 to 12 inches from December to August.

The A horizon has value of 3 to 5 when dry, chroma of 0 to 2, and hue of 10YR, 5Y, or neutral. Reaction is slightly acid or neutral. Organic matter content ranges from 2 to 6 percent. Thickness ranges from 24 to 37 inches.

The C horizon has value of 2 to 4 when moist, chroma of 0 to 3 when moist, and hue of 10YR, 5Y, or neutral. Reaction is neutral or mildly alkaline. The upper part of the C horizon is stratified loam to silty clay loam, and the lower part is silty loam, silty clay loam, or clay loam. The C horizon ranges from 0 to 15 percent rock fragments, mostly gravel. Mottles range from few to many, fine to large, and faint to prominent.

Etsel series

The Etsel series consists of very shallow, somewhat excessively drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 30 to 75 percent.

Typical pedon of Etsel very gravelly loam, 30 to 75 percent slopes; 800 feet north and 400 feet east of the southwest corner of sec. 16, T. 43 N., R. 10 W.

O1&O2—2 inches to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A1—0 to 7 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common fine and medium pores; 25 percent pebbles and 10 percent cobbles and stones; slightly acid; abrupt irregular boundary.

R—7 inches; fractured schist.

Depth to metamorphic bedrock ranges from 6 to 10 inches. The profile is 35 to 55 percent rock fragments. The content of clay ranges from 12 to 18 percent. Reaction is medium acid or slightly acid.

The A1 horizon has value of 5 or 6 when dry, chroma of 3 or 4 when dry and 2 or 3 when moist, and hue of 10YR or 7.5YR.

Facey series

The Facey series consists of deep, well drained soils on mountains. These soils formed in residuum derived from metamorphosed rock. Slope ranges from 5 to 50 percent.

Typical pedon of a Facey loam in an area of Duzel-Jilson-Facey complex, 15 to 50 percent slopes; 2,080 feet west and 700 feet north of the southeast corner of sec. 13, T. 43 N., R. 7 W.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; many interstitial pores; 10 percent pebbles; neutral; abrupt smooth boundary.

A12—3 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots and many medium roots; few very fine tubular pores and common fine vesicular pores; 10 percent pebbles; neutral; abrupt smooth boundary.

B1t—10 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots and many

medium and coarse roots; common very fine and fine tubular pores; common thin clay films lining pores; 10 percent pebbles; neutral; clear wavy boundary.

B21t—19 to 28 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots and common medium roots; common very fine and fine pores and few medium tubular pores; common thin clay films on peds and lining pores; 15 percent pebbles; slightly acid; gradual wavy boundary.

B22t—28 to 39 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots and common medium roots; common very fine and fine tubular pores; many thin clay films on peds and lining pores and few moderately thick clay films lining pores; 10 percent pebbles; slightly acid; gradual wavy boundary.

B23t—39 to 46 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots, common medium roots, and many coarse roots; few medium tubular pores and common very fine and fine tubular pores; common thin and moderately thick clay films on peds and lining pores; 10 percent pebbles; slightly acid; abrupt wavy boundary.

B3t—46 to 59 inches; very pale brown (10YR 7/3, 7/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and plastic; few very fine and fine roots and common medium roots; few fine tubular pores; few moderately thick clay films lining pores and common thin clay films lining pores; 10 percent pebbles; neutral; abrupt wavy boundary.

R—59 inches; hard metasedimentary rock.

Depth to lithic contact ranges from 40 to 60 inches. Base saturation ranges from 75 to 95 percent throughout the profile.

The A1 horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 2 or 3 when dry and 1 to 3 when moist, and hue of 10YR or 7.5YR. Reaction is slightly acid or neutral. The horizon is 15 to 20 percent clay and 5 to 15 percent rock fragments. Organic matter content is 1 to 2 percent in the upper 10 inches. Thickness of the A1 horizon ranges from 9 to 19 inches.

The B2t horizon has value of 4 to 6 when dry and 3 to 5 when moist, chroma of 3 or 4, and hue of 10YR or 7.5YR. Reaction is medium acid to neutral. The B2t horizon is loam or clay loam. It is 18 to 35 percent clay and 0 to 35 percent rock fragments.

Gazelle series

The Gazelle series consists of very poorly drained soils in basins. These soils are moderately deep to a duripan. They formed in mixed alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Gazelle silt loam, 800 feet east and 50 feet south of the northwest corner of sec. 32, T. 43 N., R. 5 W.

A11—0 to 6 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; few fine tubular pores; strongly effervescent with disseminated lime; strongly alkaline; abrupt smooth boundary.

A12—6 to 11 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak thick platy structure parting to moderate thin platy; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; strongly effervescent with disseminated lime; strongly alkaline; abrupt smooth boundary.

C1—11 to 20 inches; white (10YR 8/1) silt loam, white (10YR 8/1) moist; moderate thin platy structure; hard, firm, slightly sticky and slightly plastic; common fine tubular pores; thin coatings of calcium carbonate or silica on some peds; strongly effervescent with disseminated lime and violently effervescent in seams; moderately alkaline; abrupt smooth boundary.

C2—20 to 25 inches; white (10YR 8/1) silt loam, white (10YR 8/2) moist; moderate thin platy structure; very hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; thin coatings of calcium carbonate or silica on some ped faces; strongly effervescent with disseminated lime and violently effervescent in seams; moderately alkaline; abrupt smooth boundary.

C3casim—25 to 38 inches; white (10YR 8/1) strongly cemented thin laminar duripan with thin continuous indurated laminar seams, white (10YR 8/2) moist; very hard, very firm and brittle; thin mat of roots on surface; few very pale brown (10YR 7/4) beadlike coatings of silica or calcium carbonate on undersides of some platelets; violently effervescent in seams; moderately alkaline; abrupt smooth boundary.

C4—38 to 60 inches; white (10YR 8/1) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent with disseminated lime; strongly alkaline.

Depth to the duripan ranges from 20 to 40 inches. The solum is 8 to 18 percent clay. It is slightly effervescent to violently effervescent. Depth to the water table ranges from 0 to 18 inches from December to March. The electrical conductivity ranges from 4 to 6 millimhos per

cubic centimeter, and the sodium absorption ratio ranges from 2 to 8.

The A1 horizon has value of 4 to 6 when moist, chroma of 1 to 4 when dry and 1 to 3 when moist, and hue of 2.5Y or 10YR. It is 6 to 16 inches.

The C horizon has value of 7 or 8 when dry and 4 to 8 when moist, chroma of 1 to 3 when dry, and hue of 2.5Y, 5Y, or 10YR. It is stratified loamy sand to silty clay loam, and it averages from 10 to 30 percent clay.

Gazelle Variant

The Gazelle Variant consists of very poorly drained soils in basins. These soils are shallow to a duripan. They formed in mixed alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Gazelle Variant sandy clay loam, 2,200 feet north and 1,500 feet west of the southeast corner of sec. 34, T. 45 N., R. 5 W.

A1—0 to 12 inches; light brownish gray (10YR 6/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure; very hard, firm, sticky and plastic; many very fine and fine roots; common fine tubular pores; weakly effervescent; moderately alkaline; abrupt smooth boundary.

C1casim—12 to 18 inches; light brownish gray (10YR 6/2) and dark grayish brown (10YR 4/2) moderately cemented duripan; laminar to massive; extremely hard, very firm; many very fine and fine roots matted on surface; weakly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

C2ca—18 to 60 inches; white (10YR 8/1) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; 5 percent pebbles; violently effervescent.

Depth to the duripan ranges from 10 to 20 inches. The solum is 20 to 38 percent clay. It is moderately alkaline or strongly alkaline. A seasonal high water table is at a depth of 0 to 12 inches from December through April. Electrical conductivity ranges from 6 to 8 millimhos per cubic centimeter throughout.

The A1 horizon has value of 6 to 8 when dry and 2 to 4 when moist, chroma of 1 or 2, and hue of 2.5Y or 10YR. Organic matter content ranges from 1 to 2 percent in the upper 12 inches.

The Ccasim horizon has value of 4 to 8 when dry and 4 or 5 when moist, and it has hue of 2.5Y or 10YR. It is massive or laminar and is weakly to very strongly cemented with lime and silica. Below the duripan, the C horizon has value of 6 to 8 when dry and 4 or 5 when moist, chroma of 1 or 2, and hue of 2.5Y, 5Y, or 10YR. It is moderately alkaline or strongly alkaline. The C horizon is stratified layers of sandy loam to silty clay loam. It averages 10 to 30 percent clay and 5 to 15 percent rock fragments.

Hilt series

The Hilt series consists of moderately deep, well drained soils on hills. These soils formed in residuum derived from sandstone. Slope ranges from 2 to 50 percent.

Typical pedon of Hilt sandy loam, 15 to 30 percent slopes; 2,600 feet west and 1,750 feet south of the northeast corner of sec. 26, T. 46 N., R. 6 W.

A11—0 to 2 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; neutral; abrupt smooth boundary.

A12—2 to 6 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure; slightly hard, friable, sticky and slightly plastic; many fine and very fine roots; common fine tubular pores; neutral; abrupt smooth boundary.

A3—6 to 11 inches; dark brown (7.5YR 4/4) sandy loam, dark brown (10YR 3/3) moist; moderate medium platy structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; many fine tubular pores; few thin clay films in pores; slightly acid; clear wavy boundary.

B1t—11 to 23 inches; dark brown (7.5YR 4/4) sandy clay loam, dark yellowish brown (10YR 3/4) rubbed and moist; faces of peds are dark brown (7.5YR 3/2) when moist; weak medium prismatic structure; hard, friable, sticky and very plastic; common fine roots; common fine and medium tubular pores; common thin clay films on peds and in pores; slightly acid; clear wavy boundary.

B21t—23 to 31 inches; yellowish red (5YR 4/6) sandy clay loam, dark yellowish brown (10YR 3/4) rubbed and moist; faces of peds are dark brown (7.5YR 3/4) when moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, very sticky and very plastic; few fine roots; common fine tubular pores and few medium tubular pores; continuous thin clay films and common moderately thick clay films in pores and on peds; neutral; clear wavy boundary.

B22t—31 to 38 inches; yellowish red (5YR 4/6) sandy clay loam, dark brown (7.5YR 4/4) rubbed and moist; faces of peds are dark brown (7.5YR 3/4) when moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, slightly firm, very sticky and very plastic; few fine roots; common fine tubular pores and few medium tubular pores; continuous thin and moderately thick clay films in pores and on peds; neutral; clear wavy boundary.

Cr—38 to 47 inches; yellowish red (5YR 4/8) moderately weathered sandstone that crushes to sandy clay loam, dark brown (7.5YR 4/4) rubbed and moist;

mostly rock structure; few fine roots in fractures; many thin clay films and common moderately thick clay films on fractures; abrupt wavy boundary.

R—47 inches; sandstone with some weathering in cracks and seams; few fine roots in cracks and seams; continuous moderately thick clay films on faces of rock; some soil material in cracks and seams.

A few stones are on the surface in places. Depth to weathered sandstone ranges from 20 to 40 inches. The profile is medium acid to neutral.

The A1 horizon has value of 4 or 5 when dry, chroma of 3 or 4 when dry and 2 to 4 when moist, and hue of 10YR, 7.5YR, or 5YR. It is sandy loam or stony sandy loam. This horizon is 10 to 20 percent clay and 0 to 35 percent rock fragments. Organic matter content ranges from 1.0 to 1.3 percent in the upper 4 inches and from 0.2 to 0.5 below. Thickness of the A1 horizon ranges from 5 to 11 inches.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, chroma of 4, 6, or 8 when dry and 2 to 4 when moist, and hue of 10YR, 7.5YR, or 5YR. This horizon is loam or sandy clay loam. It averages 20 to 35 percent clay and 0 to 15 percent rock fragments.

Iller series

The Iller series consists of very deep, well drained soils on mountains. These soils formed in volcanic ash deposited over material weathered from extrusive igneous rock. Slope ranges from 9 to 50 percent.

Typical pedon of an Iller stony sandy loam in an area of Sheld-Iller stony sandy loams, 9 to 30 percent slopes; 1,525 feet west and 100 feet south of the northeast corner of sec. 19, T. 44 N., R. 3 W.

O1&O2—1 inch to 0; undecomposed and partially decomposed needles, bark, twigs, leaves, and other organic debris.

A11—0 to 2 inches; dark brown (7.5YR 4/4) stony sandy loam, dark reddish brown (5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; few fine tubular pores and many very fine interstitial pores; 7 percent pebbles, 2 percent cobbles, and 7 percent stones; weakly smeary; strongly acid; abrupt smooth boundary.

A12—2 to 13 inches; brown (7.5YR 5/4) stony sandy loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots; few fine tubular pores and many very fine interstitial pores; 15 percent pebbles, cobbles, and stones; weakly smeary; strongly acid; clear smooth boundary.

B1—13 to 21 inches; brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots and many medium roots; few fine tubular pores and many very fine interstitial pores; 7 percent pebbles, 2 percent cobbles, and 1 percent stones; weakly smeary; strongly acid; gradual wavy boundary.

B2t—21 to 28 inches; brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine and fine roots and many medium and coarse roots; common very fine and fine vesicular pores and few very fine tubular pores; few thin clay films on peds and in pores and many thin clay films bridging sand grains; 7 percent pebbles, 2 percent cobbles, and 1 percent stones; moderately smeary; strongly acid; abrupt wavy boundary.

IIB1tb—28 to 37 inches; yellowish brown (10YR 5/4) very stony sandy loam, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure parting to strong fine subangular blocky; slightly hard, friable, sticky and slightly plastic; few very fine roots and many medium and coarse roots; common very fine vesicular pores and few very fine tubular pores; common thin clay films on peds and in pores; slightly brittle; 15 percent pebbles, 5 percent cobbles, and 30 percent stones; strongly acid; abrupt wavy boundary.

IIB21tb—37 to 42 inches; brown (7.5YR 5/4) extremely stony loam, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots and many medium roots; common very fine vesicular pores and few very fine tubular pores; common thin clay films on peds and in pores; 10 percent pebbles, 10 percent cobbles, and 50 percent stones; strongly acid; clear wavy boundary.

IIB22tb—42 to 54 inches; brown (7.5YR 5/4) extremely stony loam, dark brown (7.5YR 3/4) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots and many medium roots; common very fine vesicular pores and few very fine tubular pores; common thin clay films and few moderately thick clay films on rock fragments; 10 percent pebbles, 10 percent cobbles, and 50 percent stones; slightly brittle; strongly acid; clear wavy boundary.

IIB23tb—54 to 65 inches; brown (7.5YR 5/4) extremely stony loam, dark brown (7.5YR 3/4) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots and many medium roots; common very fine vesicular pores and few very fine tubular pores; common thin clay films and few moderately thick clay films on rock fragments; slightly brittle; 10 percent pebbles, 10 percent cobbles, and 50 percent stones; strongly acid.

A few stones are on the surface in places. Bulk density ranges from 0.6 to 0.95 grams per cubic

centimeter to a depth of 10 to 20 inches. It is 0.85 gram per cubic centimeter at a depth of 10 to 14 inches. The profile is 5 to 35 percent andesite or basalt rock fragments in the overlying ash deposits. The buried soil material is 35 to 80 percent rock fragments that are similar to those in the ash deposits. Reaction ranges from slightly acid to strongly acid throughout the profile.

The A1 horizon has chroma of 2 to 4 when dry and 2 or 3 when moist, and it has hue of 10YR, 7.5YR, or 5YR. Base saturation ranges from 40 to 60 percent but is less than 50 percent in some part of the upper 10 inches. The sodium fluoride reaction ranges from 9.6 to 10.7. Content of clay ranges from 3 to 10 percent. Thickness ranges from 10 to 17 inches.

The B2t horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 3 or 4, and hue of 10YR, 7.5YR, or 5YR. Content of clay is about 5 to 12 percent. Base saturation ranges from 30 to 60 percent. The sodium fluoride reaction is 9 to 10.

The IIBtb horizon has colors similar to those of the B2t horizon. The IIBtb horizon is very stony sandy loam, extremely stony loam, or extremely stony sandy clay loam. It is 5 to 12 percent clay in the upper part and 10 to 23 percent clay in the lower part. Base saturation is 50 to 60 percent, and it commonly increases slightly with depth. The sodium fluoride reaction ranges from 8.5 to 9.0.

Ipish series

The Ipish series consists of very deep, well drained soils on mountains. These soils formed in residuum derived from serpentine. Slope ranges from 5 to 50 percent.

Typical pedon of an Ipish gravelly clay loam in an area of Dubakella-Ipish complex, 5 to 30 percent slopes; 250 feet west and 100 feet north of the southeast corner of sec. 14, T. 44 N., R. 8 W.

O1—1/4 inch to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A1g—0 to 2 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; hard, friable, very sticky and plastic; common very fine and fine roots; common fine vesicular pores; 35 percent pebbles; slightly acid; abrupt smooth boundary.

B11t—2 to 5 inches; dark brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to fine subangular blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots; few very fine tubular pores and common fine vesicular pores; few thin clay films on peds and in pores; 25 percent pebbles; slightly acid; clear smooth boundary.

B12t—5 to 10 inches; dark brown (10YR 4/3) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; strong medium subangular blocky structure; very hard, firm, very sticky and very plastic; many medium and coarse roots and common very fine and fine roots; few very fine tubular pores; many thin clay films on peds and in pores; 30 percent pebbles; slightly acid; clear wavy boundary.

B21t—10 to 15 inches; dark brown (7.5YR 4/4, dry and moist) gravelly clay loam; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; many medium and coarse roots and common very fine and fine roots; common very fine tubular pores; continuous thin clay films on peds and in pores; 25 percent pebbles; neutral; clear wavy boundary.

B22t—15 to 21 inches; dark brown (7.5YR 3/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist and rubbed; very weak medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine tubular pores; continuous thin dark brown (7.5YR 3/4, moist) clay films on peds and in pores; 30 percent pebbles; mildly alkaline; clear wavy boundary.

B23t—21 to 34 inches; dark brown (7.5YR 4/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist and rubbed; strong medium subangular blocky structure; very hard, very firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine tubular pores; many moderately thick dark reddish brown (5YR 3/4, moist) clay films on peds and in pores; 35 percent pebbles; mildly alkaline; gradual wavy boundary.

B24t—34 to 44 inches; dark brown (7.5YR 4/4, dry and moist) gravelly clay loam; very weak medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine tubular pores; continuous thick dark reddish brown (5YR 3/4, moist) clay films on peds and in pores; 30 percent pebbles; mildly alkaline; gradual wavy boundary.

B3t—44 to 65 inches; dark brown (7.5YR 4/4) very gravelly clay loam, dark brown (7.5YR 4/4) moist and rubbed; strong medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common medium roots and few very fine and fine roots; few very fine tubular pores; continuous thick reddish brown (5YR 4/4) and dark reddish brown (5YR 3/4, moist) clay films on peds and in pores; 40 percent pebbles; moderately alkaline; abrupt wavy boundary.

R—65 inches; shattered serpentine.

Depth to serpentine ranges from 60 to 80 inches.

The A1 horizon has value of 4 to 6 when dry and 3 or 4 when moist, chroma of 2 to 4 when dry and 2 or 3 when moist, and hue of 10YR or 7.5YR. Reaction is

slightly acid to mildly alkaline. Base saturation ranges from 50 to 70 percent. The A1 horizon is 18 to 27 percent clay and 15 to 35 percent rock fragments. Thickness ranges from 2 to 5 inches. Some pedons have an A3 horizon.

The B2t horizon has value of 3 to 5, chroma of 2, 3, 4, or 6 when dry and 2 to 4 when moist, and hue of 10YR or 7.5YR. Reaction is slightly acid to mildly alkaline. The B2t horizon is 27 to 35 percent clay. Base saturation ranges from 75 to 100 percent. The B3t horizon is mildly alkaline or moderately alkaline. It is 35 to 60 percent rock fragments.

Jenny series

The Jenny series consists of very deep, well drained soils on terraces. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 15 percent.

Typical pedon of Jenny clay, 2 to 15 percent slopes; 2,300 feet north and 2,250 feet east of the southwest corner of sec. 3, T. 45 N., R. 5 W.

Ap—0 to 4 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; strong fine and coarse subangular blocky structure; hard, friable, slightly sticky and plastic; slightly acid; abrupt wavy boundary.

A12—4 to 7 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; massive; hard, friable, slightly sticky and plastic; slightly acid; clear smooth boundary.

A13—7 to 16 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; weak medium prismatic structure; very hard, very firm, very sticky and very plastic; thin continuous pressure faces and slickensides; neutral; clear smooth boundary.

C1—16 to 23 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure; very hard, very firm, very sticky and very plastic; thin continuous pressure faces and intersecting slickensides; moderately alkaline; clear smooth boundary.

C2—23 to 34 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; massive; hard, firm, slightly sticky and plastic; thin continuous pressure faces; strongly effervescent, lime in seams and coating peds; moderately alkaline; clear wavy boundary.

C3—34 to 60 inches; mixed light brownish gray (10YR 6/2) and white (10YR 8/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, firm, nonsticky and slightly plastic; disseminated lime; strongly effervescent; calcium carbonate content increases with depth; moderately alkaline.

Cracks 1 to 10 centimeters wide extend to a depth of 20 to 24 inches when the soils are dry. Slickensides intersect in the lower part of the A horizon and the upper part of the C horizon, between depths of 4 and 42 inches. The profile is 5 to 30 percent rock fragments. A few cobbles are on the surface in places.

The A horizon has value of 3 or 4 when dry and 2 or 3 when moist, chroma of 1 to 3 when dry and 2 or 3 when moist, and hue of 10YR, 7.5YR, or 5YR. Reaction is slightly acid to mildly alkaline. Texture is clay or cobbly clay. The A horizon is 40 to 50 percent clay. Thickness ranges from 13 to 42 inches.

The upper part of the C horizon has value of 3 to 5 when dry, chroma of 1 to 4 when dry and 2 to 4 when moist, and hue of 10YR, 7.5YR, or 5YR. Reaction is neutral to moderately alkaline. Texture is clay or silty clay. The upper part of the C horizon is 40 to 50 percent clay. The lower part of the C horizon has value of 5 to 8 when dry and 3 to 6 when moist, chroma of 1 to 3, and hue of 10YR, 7.5YR, or 5YR. Reaction is moderately alkaline or strongly alkaline. The lower part of the C horizon is strongly effervescent or violently effervescent. Lime is disseminated or is segregated in seams and masses. Texture is stratified clay to loam.

Jilson series

The Jilson series consists of shallow, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 5 to 65 percent.

Typical pedon of a Jilson gravelly loam in an area of Duzel-Jilson-Facey complex, 15 to 50 percent slopes; 2,400 feet south and 2,960 feet east of the northwest corner of sec. 20, T. 43 N., R. 7 W.

A1—0 to 3 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots and common very fine roots; common very fine tubular pores; 20 percent pebbles; neutral; clear smooth boundary.

B21t—3 to 7 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; very few thin clay films on peds and lining pores; 20 percent pebbles; neutral; clear smooth boundary.

B22t—7 to 14 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; few thin clay films on peds and lining pores; 25 percent pebbles; slightly acid; abrupt wavy boundary.

R—14 inches; fractured metasedimentary rock.

Depth to metasedimentary rock ranges from 10 to 20 inches. The profile is 15 to 35 percent rock fragments, mostly fine and medium gravel. Reaction is slightly acid to mildly alkaline throughout the profile.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, chroma of 2 or 3, and hue of 10YR or 7.5YR. It is 12 to 18 percent clay. Thickness ranges from 2 to 4 inches.

The B2t horizon has value of 4 to 6 when dry and 3 to 5 when moist, chroma of 3, 4, or 6, and hue of 10YR or 7.5YR. It is gravelly loam or gravelly clay loam and is 18 to 35 percent clay.

Kindig series

The Kindig series consists of deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 15 to 80 percent.

Typical pedon of a Kindig gravelly loam in an area of Kindig-Neuns gravelly loams, 50 to 80 percent slopes; 1,950 feet west and 900 feet south of the northeast corner of sec. 16, T. 43 N., R. 10 W.

O1&O2—2 inches to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A1—0 to 5 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; 4 percent cobbles and stones, 6 percent pebbles 3/4 inch to 3 inches in diameter, and 10 percent pebbles less than 3/4 inch in diameter; medium acid; abrupt smooth boundary.

B1—5 to 15 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; 4 percent cobbles and stones, 6 percent pebbles 3/4 inch to 3 inches in diameter, and 20 percent pebbles less than 3/4 inch in diameter; medium acid; clear smooth boundary.

B21t—15 to 30 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; common very fine and fine tubular pores; few thin clay films in pores; 4 percent cobbles and stones, 6 percent pebbles 3/4 inch to 3 inches in diameter, and 25 percent pebbles 1/8 to 3/4 inch in diameter; medium acid; clear smooth boundary.

B22t—30 to 38 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots and many medium roots; few very fine and fine tubular pores; few thin clay films on peds and common moderately thick clay films in pores; 4 percent cobbles and stones, 6 percent pebbles 3/4 inch to 3 inches in diameter, and 33 percent pebbles 1/8 to 3/4 inch in diameter; medium acid; gradual wavy boundary.

B23t—38 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine and medium roots; common very fine and fine tubular pores; common moderately thick clay films in pores; 5 percent cobbles and stones, 6 percent pebbles 3/4 inch to 3 inches in diameter, and 35 percent pebbles 1/8 to 3/4 inch in diameter; medium acid; clear irregular boundary.

Cr—60 inches; highly fractured weathered schist; some soil material in fractures.

Depth to paralithic contact ranges from 40 to 60 inches.

The A1 horizon has value of 3 to 6 when dry and 3 or 4 when moist, chroma of 2 to 4 when dry and 2 or 3 when moist, and hue of 10YR, 7.5YR, or 2.5Y. Reaction is medium acid to neutral. The A1 horizon is 5 to 16 percent clay and 15 to 35 percent rock fragments. Organic matter content ranges from 0.5 to 1 percent in the upper 7 inches. This horizon ranges from 3 to 12 inches in thickness.

The B2t horizon has value of 5 to 7 when dry and 4 or 5 when moist, chroma of 1, 2, 3, 4, or 6 when dry and 3, 4, or 6 when moist, and hue of 10YR, 2.5Y, or 5Y. Reaction is medium acid or slightly acid. The B2t horizon is very gravelly sandy loam or very gravelly loam. It has 1 to 2 percent more clay than the A horizon. It is 35 to 60 percent rock fragments.

Kinkel series

The Kinkel series consists of very deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 2 to 50 percent.

Typical pedon of a Kinkel gravelly loam in an area of Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes; 2,400 feet north and 1,030 feet west of the southeast corner of sec. 35, T. 45 N., R. 8 W.

O1&O2—1 inch to 0; recent needles, leaves, twigs, bark, and other organic debris.

A11—0 to 2 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; hard, very friable, sticky and slightly plastic; many very fine, fine, and medium roots; common very fine and fine tubular pores; 35 percent pebbles and 3 percent cobbles; slightly acid; abrupt smooth boundary.

A12—2 to 9 inches; brown (10YR 5/3) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate

medium subangular blocky structure; hard, friable, sticky and slightly plastic; many coarse and medium roots and common very fine and fine roots; common very fine and fine tubular pores and few medium tubular pores; 35 percent pebbles and 8 percent cobbles; strongly acid; clear wavy boundary.

B11t—9 to 14 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many coarse and medium roots and common very fine and fine roots; common very fine and fine tubular pores and few medium tubular pores; common thin clay films in pores and on peds; 35 percent pebbles, 5 percent cobbles, and 1 percent stones; strongly acid; clear wavy boundary.

B12t—14 to 19 inches; light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and common very fine and fine roots; common fine and very fine tubular pores; many thin clay films in pores and on peds and few moderately thick clay films in pores; 30 percent pebbles, 4 percent cobbles, and 1 percent stones; strongly acid; gradual wavy boundary.

B21t—19 to 23 inches; variegated brown (7.5YR 5/4) and light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and few very fine and fine roots; common very fine and fine tubular pores; many thick and thin clay films in pores and many thin strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) clay films on peds; 30 percent pebbles, 4 percent cobbles, and 1 percent stones; strongly acid; gradual wavy boundary.

B22t—23 to 36 inches; variegated strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and few very fine and fine roots; common very fine and fine tubular pores; common thin and moderately thick strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) clay films on peds and in pores and few thick clay films in pores; 38 percent pebbles and 2 percent cobbles; strongly acid; gradual wavy boundary.

B23t—36 to 42 inches; variegated strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and few very fine and fine roots; common very fine and fine tubular pores; common thin and moderately thick strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) clay films in pores and on peds and few thick clay films in some pores; 38 percent pebbles, 2 percent cobbles, and 1 percent stones; strongly acid; gradual wavy boundary.

B24t—42 to 56 inches; variegated strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and few very fine and fine roots; common very fine and fine tubular pores; common thin and moderately thick strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) clay films in pores and on peds and few thick clay films in pores; 40 percent pebbles, 2 percent cobbles, and 1 percent stones; strongly acid; gradual wavy boundary.

B3t—56 to 60 inches; variegated strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) very gravelly loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and few very fine and fine roots; many very fine and fine tubular pores; common thin and moderately thick clay films in pores and on peds and few thick clay films in some pores; 40 percent pebbles and 3 percent cobbles; strongly acid.

Depth to metasedimentary or metavolcanic bedrock ranges from 60 to 80 inches. A few stones are on the surface in places.

The A1 horizon has value of 4 to 6 when dry and 2 to 4 when moist, chroma of 1 to 4 when dry and 2 to 4 when moist, and hue of 10YR or 7.5YR. Reaction is strongly acid to slightly acid. The A1 horizon is 10 to 15 percent clay and 35 to 60 percent rock fragments. Organic matter content ranges from 3 to 10 percent. Thickness ranges from 4 to 9 inches.

The B2t horizon has value of 5 to 7 when dry and 3 to 6 when moist, chroma of 3 to 6 when moist, and hue of 10YR, 7.5YR, or 5YR. Reaction is medium acid or strongly acid. The B2t horizon is very gravelly loam or very gravelly sandy loam. It averages 13 to 20 percent clay and 35 to 60 percent rock fragments. Base saturation is less than 50 percent.

Kuck series

The Kuck series consists of moderately deep, well drained soils on hills. These soils formed in residuum derived from extrusive igneous rock. Slope ranges from 2 to 50 percent.

Typical pedon of a Kuck clay loam in an area of Lassen-Kuck complex, 15 to 50 percent slopes; 2,300 feet north and 240 feet east of the southwest corner of sec. 6, T. 45 N., R. 4 W.

A11—0 to 3 inches; dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) moist; strong very fine subangular blocky structure and strong very fine

granular; hard, friable, sticky and plastic; many fine roots; neutral; abrupt smooth boundary.

A12—3 to 6 inches; dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) moist; moderate thick platy structure parting to moderate medium and fine subangular blocky; hard, friable, sticky and plastic; many fine roots; few medium tubular pores and many interstitial pores; neutral; abrupt smooth boundary.

B21t—6 to 8 inches; dark gray (10YR 4/1) clay loam, very dark brown (10YR 2/2) moist; strong thick platy structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; many fine roots; few interstitial pores; many thin clay films on peds; neutral; clear smooth boundary.

B22t—8 to 11 inches; dark gray (10YR 4/1) clay loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; many fine roots; many interstitial pores and few fine tubular pores; few moderately thick clay films and many thin clay films on peds; 10 percent pebbles and cobbles; neutral; clear smooth boundary.

B23t—11 to 20 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; many fine roots; many very fine tubular pores; continuous moderately thick clay films on peds and in pores; 10 percent cobbles and pebbles; neutral; abrupt irregular boundary.

B3t—20 to 32 inches; dark grayish brown (10YR 4/2) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; strong medium angular and subangular blocky structure; very hard, very firm, sticky and very plastic; few fine roots; many thin, moderately thick, and thick clay films on peds; 20 percent cobbles and pebbles; neutral; abrupt smooth boundary.

Cr—32 inches; fractured and slightly weathered to strongly weathered andesite.

A few stones are on the surface in places. Depth to weathered andesite ranges from 20 to 40 inches. Cracks 1 to 2 centimeters wide extend to a depth of 20 to 30 inches when the soils are dry. The profile is 5 to 30 percent rock fragments. Organic matter content ranges from 0.6 to 1.0 percent to a depth of 7 to 20 inches.

The A1 horizon has value of 2 or 3, and it has chroma of 1 to 3 when dry and 2 or 3 when moist. It is stony clay loam, very stony clay loam, or clay loam and is 27 to 35 percent clay. Reaction is slightly acid to neutral. Content of organic matter ranges from 1 to 2 percent in the upper 7 inches. Thickness of the A1 horizon ranges from 4 to 9 inches.

The B2t horizon has value of 4 or 5 when dry and 2 to 4 when moist, chroma of 1 or 2 when dry and 2 or 3 when moist, and hue of 10YR to 7.5YR. It is clay loam, stony clay loam, silty clay loam, stony silty clay loam, stony clay, or clay and is 35 to 50 percent clay. Reaction is neutral or mildly alkaline.

Lassen series

The Lassen series consists of moderately deep, well drained soils on hills. These soils formed in residuum derived from extrusive igneous rock. Slope ranges from 2 to 50 percent.

Typical pedon of Lassen clay, 9 to 15 percent slopes; 400 feet north and 70 feet west of the southeast corner of sec. 16, T. 46 N., R. 5 W.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure parting to strong fine angular blocky; very hard, firm, very sticky and very plastic; many very fine and fine roots; cracks 1 to 2 inches wide and 1 to 3 feet apart; 5 percent pebbles and 2 percent cobbles; mildly alkaline; abrupt smooth boundary.

A12—4 to 9 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine discontinuous tubular pores; weakly expressed continuous pressure faces; cracks 1 to 2 inches wide and 1 to 3 feet apart; 5 percent pebbles and 2 percent cobbles; mildly alkaline; clear smooth boundary.

A13—9 to 26 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure and some wedge shaped structural aggregates; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few discontinuous pores; strongly expressed continuous pressure faces, many small intersecting slickensides; cracks 1/8 to 1 inch wide; 5 percent pebbles and 2 percent cobbles; mildly alkaline; abrupt wavy boundary.

C—26 to 28 inches; dark grayish brown (2.5Y 4/2) gravelly clay, dark grayish brown (2.5Y 4/2) and dark brown (10YR 3/3) moist; massive; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine and fine discontinuous tubular pores; strongly expressed continuous pressure faces; 25 percent pebbles 2 to 3 centimeters in diameter; mildly alkaline; abrupt wavy boundary.

R—28 inches; hard extrusive igneous bedrock.

A few to many stones are on the surface in places. Depth to extrusive igneous rock ranges from 20 to 40 inches. Cracks 1 to 10 centimeters wide extend to a depth of 20 to 26 inches when the soils are dry.

The A1 horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 2 or 3, and hue of 10YR, 7.5YR, or 5YR. Reaction is neutral or mildly alkaline.

This horizon is clay, cobbly clay, stony clay, or very stony clay. It is 40 to 60 percent clay and 5 to 35 percent rock fragments. Thickness ranges from 18 to 35 inches. Slickensides intersect at a depth of 9 to 27 inches in the lower part of the A horizon in some pedons.

The C horizon has value of 3 to 5 when dry, chroma of 2 to 4, and hue of 2.5Y, 10YR, 7.5YR, or 5YR. Reaction is neutral to moderately alkaline. This horizon is gravelly clay, gravelly clay loam, cobbly clay, or cobbly clay loam. It is 35 to 60 percent clay and 15 to 35 percent rock fragments.

Louie series

The Louie series consists of well drained soils on terraces. These soils are moderately deep to a hardpan. They formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 15 percent.

Typical pedon of a Louie stony loam in an area of Rock outcrop-Louie complex, 0 to 15 percent slopes; 2,700 feet east and 200 feet north of the southwest corner of sec. 1, T. 43 N., R. 5 W.

A11—0 to 3 inches; light brownish gray (10YR 6/2) stony loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial pores; 5 percent stones, 10 percent cobbles, and 15 percent pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 6 inches; light brownish gray (10YR 6/2) stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots; few very fine tubular pores and fine interstitial pores; 5 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.

A13—6 to 12 inches; light brownish gray (10YR 6/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine tubular pores; few very thin clay films in pores and on peds; 3 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; abrupt smooth boundary.

B1t—12 to 21 inches; yellowish brown (10YR 5/4) cobbly loam, dark brown (10YR 3/3) rubbed; faces of peds are very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine and fine tubular pores; common thin clay films in pores and on peds; 3 percent stones, 10 percent cobbles, and 10 percent pebbles; mildly alkaline; clear smooth boundary.

B2t—21 to 29 inches; yellowish brown (10YR 5/4) cobbly sandy clay loam, dark brown (10YR 3/3) rubbed; faces of peds are dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; few very fine and fine tubular pores; continuous moderately thick clay films in pores and on peds; 3 percent stones, 10 percent cobbles, and 10 percent pebbles; mildly alkaline; abrupt wavy boundary.

C1sim—29 to 32 inches; light yellowish brown (10YR 6/4) strongly cemented duripan, dark yellowish brown (10YR 3/4) moist; laminar to platy structure; few masses or thin seams of segregated lime; cementing agent is dominantly silica with some lime and iron; abrupt smooth boundary.

C2—32 to 60 inches; stratified sand, gravel, cobbles, and some stones.

A few stones are on the surface in places. Depth to the duripan ranges from 20 to 40 inches. The duripan is moderately cemented to very strongly cemented and is continuously indurated in some places. Lime is in some cracks or seams. The profile is 0 to 35 percent rock fragments.

The A1 horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 2 or 3, and hue of 2.5Y or 10YR. Reaction is slightly acid to mildly alkaline. This horizon is loam, cobbly loam, or stony loam and is 10 to 20 percent clay. Content of organic matter is less than 1 percent. Thickness of the A1 horizon ranges from 8 to 17 inches.

The B2t horizon has value of 5 to 7 when dry and 3 to 5 when moist, and it has chroma of 3 or 4 when dry and 2 to 4 when moist. Reaction is neutral to moderately alkaline. This horizon is sandy clay loam, clay loam, stony clay loam, cobbly sandy clay loam, or stony sandy clay loam. It averages 20 to 30 percent clay.

Louie Variant

The Louie Variant consists of well drained soils on terraces. These soils are moderately deep to a hardpan. They formed in alluvium weathered from extrusive igneous rock Slope ranges from 2 to 9 percent.

Typical pedon of Louie Variant sandy clay loam, 2 to 9 percent slopes; 1,600 feet south and 1,600 feet west of the northeast corner of sec. 6, T. 45 N., R. 5 W.

Ap—0 to 7 inches; gray (10YR 6/1) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; violently effervescent; moderately alkaline; abrupt smooth boundary.

A12—7 to 15 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; many very fine and fine roots; many fine tubular pores; few thin clay films in pores; violently effervescent; moderately alkaline; clear smooth boundary.

B22t—15 to 26 inches; light brownish gray (10YR 6/2) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; few medium tubular pores; many moderately thick clay films on peds and in pores and common thin clay films on peds; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—26 to 33 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and nonplastic; common fine roots; few medium tubular pores; violently effervescent; moderately alkaline; abrupt irregular boundary.

C2casi—33 to 60 inches; duripan that has white (10YR 8/2) coating and light brownish gray (10YR 6/2) interior, pale brown (10YR 6/3) moist; massive; hard, very firm; moderately cemented with lime and silica; coatings of silica on some structure faces; violently effervescent; moderately alkaline.

Depth to the duripan ranges from 20 to 40 inches. The duripan has value of 6 to 8 when dry and 4 to 6 when moist, and it has chroma of 1 or 2 when dry and 2 or 3 when moist. It is weakly cemented or moderately cemented but is not continuously indurated in any part. Thickness of the solum ranges from 20 to 30 inches. The profile is 0 to 5 percent rock fragments. Reaction is mildly alkaline or moderately alkaline.

The A1 horizon has value of 6 or 7 when dry and 3 to 5 when moist, and it has chroma of 1 to 3. It is 20 to 27 percent clay. Content of organic matter is less than 1 percent in the upper 15 inches. Thickness of the A1 horizon ranges from 6 to 19 inches.

The B2t horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 1 or 2 when dry and 2 or 3 when moist. It is sandy clay loam or clay loam and is 25 to 35 percent clay.

The C horizon has value of 6 to 8 when dry and 4 to 6 when moist, and it has chroma of 1 or 2 when dry and 2 or 3 when moist. The C horizon is loam or sandy loam and is 15 to 25 percent clay.

Marpa series

The Marpa series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 5 to 50 percent.

Typical pedon of a Marpa gravelly loam in an area of Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes; 2,200 feet north and 1,250 feet east of the southwest corner of sec. 12, T. 40 N., R. 9 W.

O1&O2—2 inches to 0; partially decomposed and undecomposed needles, leaves, twigs, bark, and other organic debris.

A11—0 to 3 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, sticky and nonplastic; many fine roots; 30 percent pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 14 inches; pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many fine and medium roots; many fine tubular pores and fine random interstitial pores; 30 percent pebbles; medium acid; clear smooth boundary.

B22t—14 to 30 inches; light yellowish brown (10YR 6/4) very gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine, medium, and coarse roots; many fine tubular pores and many fine random interstitital pores; common thin clay films on peds and lining pores; 40 percent pebbles; strongly acid; abrupt irregular boundary.

R—30 inches; fractured metasedimentary bedrock; some soil material and roots in cracks.

Depth to fractured metamorphic bedrock ranges from 20 to 40 inches.

The A1 horizon has value of 5 to 7 when dry and 3 or 4 when moist, chroma of 2 or 4, and hue of 10YR or 7.5YR. Reaction is medium acid or slightly acid. This horizon is 15 to 25 percent clay and 15 to 35 percent rock fragments. Content of organic matter is less than 1 percent. Thickness of the A1 horizon ranges from 11 to 16 inches.

The B2t horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 3 or 4, and hue of 10YR, 7.5YR, or 5YR. Reaction is medium acid or strongly acid. This horizon is very gravelly clay loam or very gravelly sandy clay loam. It averages 27 to 35 percent clay and 35 to 60 percent rock fragments.

Mary series

The Mary series consists of moderately deep, well drained soils on hills. These soils formed in residuum derived from extrusive igneous rock. Slope ranges from 2 to 50 percent.

Typical pedon of Mary stony loam, 2 to 50 percent slopes; 700 feet south and 1,500 feet west of the northeast corner of sec. 19, T. 46 N., R. 5 W.

A11—0 to 2 inches; dark brown (10YR 4/3) stony loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; many fine interstitial pores; 3 percent stones, 3 percent cobbles, and 1 percent fine pebbles; neutral; abrupt smooth boundary.

A12—2 to 10 inches; dark brown (10YR 4/3) stony loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and

plastic; common very fine and fine roots; few very fine and fine tubular pores and few very fine vesicular pores; 3 percent stones, 1 percent cobbles, and 1 percent fine pebbles; neutral; gradual smooth boundary.

B1t—10 to 17 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist, dark brown (10YR 3/3) moist and rubbed; weak medium prismatic structure; hard, slightly firm, sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores and few very fine vesicular pores; common thin clay films on peds; 1 percent fine pebbles; neutral; gradual smooth boundary.

B2t—17 to 24 inches; dark yellowish brown (10YR 4/4) clay loam, very dark grayish brown (10YR 3/2) moist, dark brown (10YR 3/3) moist and rubbed; weak medium prismatic structure; very hard, slightly firm, sticky and very plastic; few very fine and fine roots; few medium, fine, and very fine tubular pores; common thin clay films on peds and many thin clay films lining pores; 1 percent cobbles and 1 percent pebbles; neutral; abrupt wavy boundary.

B3t—24 to 28 inches; dark yellowish brown (10YR 4/4) sandy clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure; very hard, slightly firm, sticky and very plastic; few very fine and fine roots; few very fine, fine, and medium tubular pores; many thin clay films on peds and lining pores and few moderately thick clay films on peds; 1 percent cobbles and 1 percent pebbles; neutral; abrupt wavy boundary.

R—28 inches; extrusive igneous bedrock.

A few stones are on the surface in places. Depth to igneous bedrock ranges from 20 to 40 inches.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, chroma of 2 to 4 when dry and 2 or 3 when moist, and hue of 10YR or 7.5YR. Reaction is slightly acid or neutral. This horizon is loam or stony loam. It is 12 to 25 percent clay and 5 to 30 percent rock fragments. Thickness of the A1 horizon ranges from 7 to 14 inches. Organic matter content ranges from 1 to 3 percent in the upper 2 to 5 inches but is less than 1 percent below a depth of 5 inches.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, chroma of 2 to 4 when dry or moist, and hue of 10YR or 7.5YR. Reaction is neutral or mildly alkaline. This horizon is heavy loam or clay loam. It averages 20 to 35 percent clay and 0 to 15 percent rock fragments.

Medford series

The Medford series consists of very deep, moderately well drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 15 percent.

Typical pedon of Medford clay loam, cool, 5 to 15 percent slopes; 2,080 feet north and 1,450 feet east of the southwest corner of sec. 21, T. 46 N., R. 4 W.

A11—0 to 6 inches; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; strong fine granular structure; hard, friable, sticky and plastic; many very fine and fine roots; few fine vesicular pores and common fine tubular pores; slightly acid; abrupt smooth boundary.

A12—6 to 12 inches; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; strong fine granular structure; hard, friable, sticky and very plastic; many very fine and fine roots; few very fine tubular pores and common fine vesicular pores; slightly acid; clear smooth boundary.

A3—12 to 18 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure and moderate medium subangular blocky; hard, firm, sticky and very plastic; common very fine and fine roots; common fine and very fine tubular pores; common thin clay films on peds and lining pores; slightly acid; clear smooth boundary.

B1t—18 to 26 inches; dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; weak medium prismatic structure and strong medium subangular blocky; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; many thin clay films on peds and lining pores; slightly acid; clear smooth boundary.

B21t—26 to 35 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure and moderate fine prismatic; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; continuous thick clay films and many moderately thick clay films on peds and lining pores; slightly acid; clear smooth boundary.

B22t—35 to 41 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure; extremely hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; common moderately thick and thick clay films on peds and lining pores; neutral; clear smooth boundary.

B23t—41 to 49 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure; very hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; few moderately thick clay films and many thin clay films on peds and lining tubular pores; neutral; clear smooth boundary.

C—49 to 60 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; very hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; neutral.

Thickness of the solum ranges from 40 to 60 inches. The profile is 0 to 15 percent rock fragments. Reaction is medium acid to neutral. The mollic epipedon is more than 20 inches thick.

The A1 horizon has value of 3 to 5 when dry and chroma of 1 to 3. It is 27 to 35 percent clay. Content of organic matter ranges from 1 to 4 percent in the upper part, and it decreases regularly with depth. Thickness of the A1 horizon ranges from 10 to 22 inches.

The B2t horizon has chroma of 2 to 4. It is clay, clay loam, silty clay, or silty clay loam, and it averages 35 to 45 percent clay.

Montague series

The Montague series consists of moderately deep, well drained soils on terraces. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 9 percent.

Typical pedon of Montague clay, 2 to 9 percent slopes; 1,800 feet west and 430 feet north of the southeast corner of sec. 29, T. 46 N., R. 5 W.

Ap—0 to 4 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong coarse angular blocky structure parting to strong medium angular blocky; very hard, firm, very sticky and very plastic; few very fine and fine roots; few fine tubular pores; neutral; abrupt smooth boundary.

A12—4 to 16 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist and rubbed; faces of peds are very dark grayish brown (10YR 3/2) when dry or moist; strong medium prismatic structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; few fine tubular pores; common intersecting slickensides and pressure faces; neutral; gradual smooth boundary.

A13—16 to 24 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist and rubbed; faces of peds are very dark grayish brown (10YR 3/2) when dry or moist; moderate medium prismatic structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; few fine tubular pores; common intersecting slickensides and pressure faces; neutral; abrupt smooth boundary.

C1cam—24 to 36 inches; white (10YR 8/2) strongly cemented petrocalcic horizon; violently effervescent with dilute acid; silica in thin discontinuous seams; moderately alkaline; abrupt smooth boundary.

IIC2r—36 inches; weathered tuff.

A few cobbles are on the surface in places. Depth to the petrocalcic horizon is 20 to 40 inches. Depth to weathered tuff is 30 to 48 inches. Cracks 1 to 10 centimeters wide extend to a depth of 20 to 24 inches when the soils are dry. Slickensides intersect at a depth of 4 to 24 inches. The profile is 0 to 35 percent rock fragments. Reaction of the solum is slightly acid or neutral.

The A horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 1 to 4 when dry and 1 to 3 when moist, and hue of 10YR or 7.5YR. Chroma of 1 when moist is only in the upper 2 to 8 inches. The A horizon is clay or cobbly clay and is 40 to 50 percent clay.

The Ccam horizon is strongly effervescent or violently effervescent. It commonly is 6 to 12 inches thick, but it is as much as 24 inches thick. This horizon is moderately cemented to strongly cemented.

Montague Variant

The Montague Variant consists of shallow, well drained soils on terraces. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 9 percent.

Typical pedon of Montague Variant clay, 0 to 9 percent slopes; 1,400 feet west and 1,400 feet north of the southeast corner of sec. 28, T. 45 N., R. 6 W.

A11—0 to 4 inches; grayish brown (10YR 5/2) clay, very dark brown (10YR 2/2) moist; moderate thin platy structure parting to strong fine granular; hard, firm, sticky and plastic; many very fine and fine roots; few fine tubular pores and common fine vesicular pores; 5 percent pebbles; slightly acid; abrupt smooth boundary.

A12—4 to 12 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and very plastic; common very fine and fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

C1cam—12 to 15 inches; very strongly cemented to indurated lime hardpan; massive; very hard; thin laminar silica coatings in some of the upper parts of the hardpan.

IIC2r—15 inches; weathered tuff.

Depth to the petrocalcic horizon is 10 to 20 inches, and depth to weathered tuff is 15 to 44 inches. The profile is 0 to 5 percent rock fragments. The solum is 40 to 50 percent clay. It is slightly acid or neutral.

The A1 horizon has value of 4 or 5 when dry and chroma of 2 or 3. Content of organic matter ranges from 1 to 2 percent in the upper 12 inches.

The C1cam horizon is 3 to 24 inches thick.

Neer series

The Neer series consists of moderately deep, well drained soils on hills. These soils formed in volcanic ash overlying extrusive igneous rock. Slope ranges from 2 to 50 percent.

Typical pedon of a Neer gravelly sandy loam in an area of Ponto-Neer complex, 2 to 15 percent slopes; 500 feet north and 1,200 feet west of the southeast corner of sec. 22, T. 40 N., R. 4 W.

O1&O2—2 inches to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A11—0 to 2 inches; dark brown (10YR 4/3) gravelly sandy loam, black (N 2/0) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent fine shotlike pebbles 2 to 5 millimeters in diameter; weakly smeary; medium acid; abrupt smooth boundary.

A12—2 to 5 inches; dark brown (10YR 4/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many fine interstitial pores; 30 percent fine shotlike pebbles 2 to 5 millimeters in diameter; weakly smeary; medium acid; abrupt smooth boundary.

A3—5 to 9 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and many medium roots; few fine tubular pores and many fine random interstitial pores; common thin silt coatings bridging sand grains; 30 percent fine shotlike pebbles 2 to 5 millimeters in diameter; weakly smeary; medium acid; clear smooth boundary.

B21—9 to 16 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many medium and coarse roots and common very fine and fine roots; few fine tubular pores; many thin silt coatings bridging sand grains; 35 percent mostly fine shotlike pebbles 2 to 5 millimeters in diameter and 5 percent cobbles; weakly smeary; medium acid; clear smooth boundary.

B22—16 to 26 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots and many medium and coarse roots; few fine tubular pores; many thin silt coatings bridging sand grains; 40 percent mostly fine shotlike pebbles 2 to 5 millimeters in diameter and 5 percent cobbles; weakly smeary; medium acid; abrupt smooth boundary.

IICr—26 inches; extrusive igneous rock; very fine, fine, and medium roots matted on surface.

A few stones are on the surface in some places. Depth to paralithic contact ranges from 20 to 40 inches. The solum is strongly acid to slightly acid. Bulk density ranges from 0.5 to 0.95 gram per cubic centimeter or more to a depth of 10 to 30 inches, but it is 0.85 gram per cubic centimeter at a depth of 10 to 14 inches. The sodium fluoride reaction ranges from 10.0 to 10.7 throughout the profile.

The A horizon has value of 3 to 6 when dry and 2 to 4 when moist, chroma of 2 to 4 when dry and 0, 2, 3, or 4 when moist, and hue of 10YR, 7.5YR, or 5YR. This horizon is gravelly sandy loam or stony sandy loam. It is 3 to 15 percent clay and 15 to 35 percent rock fragments. Thickness ranges from 4 to 18 inches. Base saturation ranges from 20 to 50 percent.

The B2 horizon has value of 5 to 7 when dry and 4 or 5 when moist, chroma of 4 or 6, and hue of 10YR, 7.5YR, or 5YR. This horizon has 1 to 2 percent more clay than the A horizon, and it is 35 to 60 percent rock fragments.

Neuns series

The Neuns series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from metamorphic rock. Slope ranges from 15 to 80 percent.

Typical pedon of a Neuns gravelly loam in an area of Kindig-Neuns gravelly loams, 50 to 80 percent slopes; 1,300 feet west and 1,600 feet north of the southeast corner of sec. 16, T. 43 N., R. 10 W.

O1—2 inches to 0; undecomposed and partially decomposed needles, leaves, bark, stems, and other organic debris.

A1—0 to 3 inches; dark brown (10YR 4/3) gravelly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 20 percent pebbles; medium acid; clear smooth boundary.

A3—3 to 8 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles; medium acid; clear wavy boundary.

B21t—8 to 16 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; few thin clay bridges between mineral grains; 10 percent stones and cobbles and 40 percent pebbles; medium acid; clear wavy boundary.

B22t—16 to 35 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots and many medium and coarse roots; few thin clay bridges between mineral grains; 10 percent stones and cobbles and 40 percent pebbles; medium acid; abrupt wavy boundary.

R—35 inches; fractured, hard metamorphosed siltstone; some soil material in fractures.

Depth to hard, fractured bedrock ranges from 20 to 40 inches. The solum is strongly acid to slightly acid. Base saturation is 50 to 60 percent below a depth of 10 inches. The control section averages 8 to 18 percent clay.

The A1 horizon has value of 3 to 6 when dry and 2 or 3 when moist, chroma of 2 to 4 when dry and 2 or 3 when moist, and hue of 2.5Y, 10YR, or 7.5YR. Content of organic matter ranges from 0.5 to 0.9 percent in the upper 7 inches. Thickness of the A1 horizon ranges from 2 to 8 inches.

The Bt horizon has value of 4 to 6 when dry and 3 to 5 when moist, and it has hue of 2.5Y, 10YR, or 7.5YR. This horizon is very gravelly sandy loam or very gravelly loam. It has 1 to 2 percent more clay than the A horizon and is 35 to 60 percent rock fragments.

Some pedons have a C horizon that is 35 to 80 percent rock fragments.

Odas series

The Odas series consists of very deep, poorly drained soils on flood plains. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Typical pedon of Odas sandy loam, 1,200 feet south and 700 feet west of the northeast corner of sec. 24, T. 39 N., R. 3 W. (outside the soil survey area).

A11—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; weak very fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine matted roots; 5 percent pebbles; strongly acid; abrupt smooth boundary.

A12—3 to 8 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; massive; slightly hard, friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine tubular pores and common fine vesicular pores; 5 percent pebbles; strongly acid; abrupt smooth boundary.

A13—8 to 16 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; very weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine tubular pores and common fine vesicular pores; 5 percent pebbles; strongly acid; abrupt wavy boundary.

A14—16 to 31 inches; dark grayish brown (2.5Y 4/2) sandy loam, very dark brown (10YR 2/2) moist; few fine distinct olive brown (2.5Y 4/4, moist) mottles; very weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; few fine tubular pores and common vesicular pores; 5 percent pebbles; strongly acid; abrupt wavy boundary.

C1—31 to 34 inches; grayish brown (2.5Y 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct olive brown (2.5YR 4/4, moist) mottles; very weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many medium roots and common very fine and fine roots; few very fine and fine tubular pores and common fine vesicular pores; 5 percent pebbles; strongly acid; abrupt wavy boundary.

C2—34 to 41 inches; grayish brown (2.5Y 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct dark yellowish brown (10YR 4/4, moist) mottles; very weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and medium roots; few very fine and fine tubular pores; 5 percent pebbles; medium acid; clear wavy boundary.

C3g—41 to 53 inches; light brownish gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) moist; common large distinct dark yellowish brown (10YR 4/4, moist) mottles; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots and common medium roots; few fine and very fine tubular pores and common fine vesicular pores; slightly brittle in pockets; 5 percent pebbles; medium acid; abrupt wavy boundary.

C4g—53 to 60 inches; gray (10YR 6/1) sandy loam, dark grayish brown (2.5Y 4/2) moist; common medium distinct olive brown (2.5Y 4/4, moist) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; common medium roots and few fine and very fine roots; few fine and very fine tubular pores; 5 percent pebbles; medium acid; water table at a depth of 54 inches.

The profile is 6 to 18 percent clay. Reaction is strongly acid or medium acid. The water table is at the surface 1 to 2 weeks in March and April and fluctuates between depths of 18 and 36 inches the rest of the year. Content of rock fragments in the profile ranges from 5 to 15 percent.

The A1 horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 1 or 2 when dry and 0 to 2 when moist, and hue of 10YR, 2.5Y, or neutral. Base saturation ranges from 35 to 60 percent but is less than 50 percent in the upper 5 to 10 inches.

The C horizon has chroma of 1 to 3 and hue of 10YR or 2.5Y.

Oosen series

The Oosen series consists of very deep, somewhat excessively drained soils on mountains (fig. 8). These soils formed in coarse volcanic ash. Slope is 2 to 50 percent.

Typical pedon of an Oosen loamy sand in an area of Avis-Oosen complex, 5 to 30 percent slopes; 1,200 feet

Figure 8.—Typical profile of an Oosen loamy sand in an area of Avis-Oosen complex, 5 to 30 percent slopes. Tape measure on left gives depth in centimeters, and that or right gives depth in feet.

west and 1,030 feet south of the northeast corner of sec. 33, T. 45 N., R. 3 W.

O1—1/4 inch to 0; fresh needles, twigs, bark, and other organic debris.

A11—0 to 1 inch; dark brown (10YR 4/3) loamy sand, very dark grayish brown (10YR 3/2) moist; very weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 2 percent cobbles and 5 percent pebbles; medium acid; abrupt smooth boundary.

A12—1 inch to 4 inches; dark brown (10YR 4/3) loamy sand, very dark grayish brown (10YR 3/2) moist; very weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; medium acid; abrupt smooth boundary.

A13—4 to 12 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 3/4) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; medium acid; abrupt smooth boundary.

C1—12 to 28 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 3/4) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; the lower 6 to 15 inches is a discontinuous stone line that is mostly a single layer of stones and cobbles; medium acid; clear wavy boundary.

IIC2—28 to 35 inches; dark brown (10YR 4/3) sand, very dark grayish brown (10YR 3/2) moist; massive; hard and firm in the upper part, soft and very friable in the lower part, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; weakly cemented with silica in upper part; medium acid; clear smooth boundary.

IIC3—35 to 42 inches; dark brown (10YR 3/3) sand, very dark brown (10YR 3/2) moist; single grain; loose; individual sand grains are mostly black and orange and are porous; medium acid; clear smooth boundary.

IIC4—42 to 72 inches; dark brown (10YR 3/3) sand, black (10YR 2/1) moist; single grain; loose; individual sand grains are mostly black and orange and are porous; medium acid.

The profile is 0 to 15 percent rock fragments and 0 to 5 percent clay. Reaction is neutral to medium acid. Base saturation ranges from 5 to 40 percent throughout the profile. The sodium fluoride reaction ranges from 10.9 at the surface to 9.6 at a depth of 40 to 72 inches. The 10- to 40-inch control section has a weighted average of 10 to 20 percent very coarse sand and coarse sand and 35 to 50 percent fine sand and very fine sand.

The A horizon has value of 3 to 6 when dry and chroma of 2 to 4 when dry. Thickness ranges from 10 to 20 inches.

The C horizon has value of 5 or 6 when dry and 3 or 4 when moist, and it has chroma of 2 to 4 when dry. It is loamy sand or loamy fine sand. The IIC horizon has chroma of 1 to 3 when dry.

Orset series

The Orset series consists of very deep, well drained soils on terraces. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 0 to 9 percent.

Typical pedon of Orset sandy loam, 0 to 9 percent slopes; 800 feet east and 325 feet south of the northwest corner of sec. 33, T. 45 N., R. 2 W. (outside the soil survey area).

O1—1/2 inch to 0; undecomposed and partially decomposed needles, bark, grass, and other organic debris.

A1—0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many medium roots and common fine roots; many fine interstitial pores; slightly acid; abrupt smooth boundary.

AC—4 to 13 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium roots and common fine roots; many fine interstitial pores; medium acid; abrupt smooth boundary.

C1—13 to 26 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few medium tubular pores and many fine interstitial pores; medium acid; abrupt smooth boundary.

C2—26 to 42 inches; very pale brown (10YR 7/3) loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots and common medium roots; few fine tubular pores and many fine interstitial pores; medium acid; clear smooth boundary.

C3si—42 to 48 inches; very pale brown (10YR 7/4) loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores; discontinuous weak silica cementation; medium acid; abrupt wavy boundary.

C4si—48 to 60 inches; very pale brown (10YR 7/4) loam, dark brown (10YR 3/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine tubular pores and many fine interstitial pores; discontinuous moderate silica cementation; medium acid.

Thickness of the solum ranges from 9 to 17 inches. The profile is 0 to 15 percent rock fragments and 10 to 18 percent clay. Reaction is medium acid or slightly acid throughout. Base saturation ranges from 50 to 80 percent and is more than 60 percent in some part of the upper 3 inches of the profile.

The A1 horizon has value of 5 or 6 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. Content of organic matter ranges from 0.50 to 0.95 percent in the upper part. Thickness ranges from 2 to 6 inches.

The C horizon has value of 6 to 8 when dry and 3 or 4 when moist, chroma of 2 to 4 when dry and 2 or 3 when moist, and hue of 10YR to 2.5Y.

Pinehurst series

The Pinehurst series consists of deep, well drained soils on mountains. These soils formed in residuum derived from extrusive igneous rock. Slope ranges from 2 to 50 percent.

Typical pedon of Pinehurst stony loam, 2 to 15 percent slopes; 340 feet west and 200 feet north of the southeast corner of sec. 33, T. 47 N., R. 4 W.

O1&O2—1 inch to 0; undecomposed and partially decomposed needles, twigs, leaves, bark, grass, and other organic debris.

A11—0 to 3 inches; dark brown (10YR 3/3) stony loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent stones and cobbles and 15 percent pebbles; slightly acid; abrupt smooth boundary.

A12—3 to 10 inches; dark brown (7.5YR 4/2) stony loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many very fine, fine, and medium roots; few very fine and fine vesicular pores; 10 percent stones and cobbles and 15 percent pebbles; medium acid; abrupt smooth boundary.

A3—10 to 14 inches; reddish brown (5YR 4/3) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; many medium and coarse roots and common very fine and fine roots; few very fine and fine vesicular pores; 8 percent stones and cobbles and 17 percent pebbles; slightly acid; clear wavy boundary.

B1t—14 to 20 inches; reddish brown (5YR 4/3) gravelly loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; many medium and coarse roots and common very fine and fine roots; few fine vesicular and tubular pores; common thin and moderately thick clay films lining pores and on peds; 10 percent stones and cobbles and 20 percent pebbles; slightly acid; clear wavy boundary.

B21t—20 to 28 inches; dark brown (7.5YR 4/2) gravelly clay loam, dark reddish brown (5YR 3/3) moist;

weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine and fine tubular pores; many moderately thick clay films lining pores and on peds; 10 percent stones and cobbles and 20 percent pebbles; slightly acid; gradual wavy boundary.

B22t—28 to 39 inches; dark brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; many medium roots and few very fine and fine roots; many moderately thick clay films lining pores and on peds; 10 percent stones and cobbles and 20 percent pebbles; slightly acid; gradual wavy boundary.

B23t—39 to 48 inches; dark brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; many medium roots and few very fine and fine roots; few very fine tubular pores; continuous moderately thick clay films lining pores and on peds; 10 percent stones and cobbles and 20 percent pebbles that are mostly saprolite; slightly acid; gradual wavy boundary.

B31t—48 to 55 inches; dark brown (10YR 4/3) very stony clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine and fine roots and many medium roots; few very fine tubular pores; common thin and moderately thick clay films lining pores and on peds; 30 percent stones and cobbles and 30 percent pebbles that are mostly saprolite; slightly acid; abrupt irregular boundary.

B32t—55 to 60 inches; dark brown (10YR 4/3) very stony clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine and fine roots and many medium roots; few very fine tubular pores; common moderately thick and thin clay films lining pores and on peds; 30 percent stones and cobbles and 30 percent pebbles that are mostly saprolite; slightly acid; clear wavy boundary.

Cr—60 inches; weathered extrusive igneous bedrock.

Depth to bedrock ranges from 40 to 60 inches. The mollic epipedon is more than 20 inches thick. Content of organic matter ranges from 1 to 4 percent in the upper 15 inches.

The A horizon has value of 3 to 5 when dry and hue of 10YR, 7.5YR, or 5YR. Reaction is medium acid or slightly acid. This horizon is 15 to 25 percent clay and 15 to 35 percent rock fragments. Base saturation is less than 75 percent in some parts of the upper 30 inches. Organic matter content decreases regularly with depth. The A horizon is 13 to 16 inches thick.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, chroma of 2 to 4, and hue of 10YR, 7.5YR, or 5YR. It is strongly acid to slightly acid. This horizon is gravelly loam or gravelly clay loam. It averages 20 to 35 percent clay and 15 to 35 percent rock fragments. The B3t horizon is 20 to 30 percent clay and 35 to 60 percent rock fragments.

Pinehurst Variant

The Pinehurst Variant consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from andesite. Slope ranges from 0 to 65 percent.

Typical pedon of Pinehurst Variant very stony loam, 0 to 15 percent slopes; 1,800 feet east and 1,350 feet south of the northwest corner of sec. 19, T. 48 N., R. 4 W.

A11—0 to 2 inches; dark brown (7.5YR 4/4) very stony loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium roots; many very fine vesicular pores, common fine vesicular pores, and few medium vesicular pores; 25 percent stones and 20 percent pebbles; slightly acid; abrupt smooth boundary.

A12—2 to 6 inches; dark reddish brown (5YR 3/4) very stony loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots and common fine and medium roots; few very fine and fine tubular pores; 25 percent stones and 20 percent pebbles; slightly acid; abrupt smooth boundary.

A3—6 to 12 inches; dark reddish brown (5YR 3/4) very stony loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots and common medium roots; few very fine and medium tubular pores and common fine vesicular pores; few thin clay films lining tubular pores; 25 percent stones and 20 percent pebbles; neutral; abrupt smooth boundary.

B2t—12 to 26 inches; dark reddish brown (5YR 3/4) very cobbly clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots and many medium and coarse roots; common very fine and fine tubular pores; continuous thin clay films on peds and in pores; 1 percent stones, 25 percent cobbles, and 20 percent pebbles; neutral; clear smooth boundary.

Cr—26 inches; weathered andesite.

Depth to weathered andesite ranges from 20 to 40 inches. The profile is 35 to 60 percent rock fragments. The solum is slightly acid to mildly alkaline. Content of organic matter ranges from 1 to 2 percent in the upper 7

inches. It is less than 1 percent below a depth of 20 inches.

The A horizon has value of 2 or 3 when moist and chroma of 2 or 4 when dry. It is 16 to 27 percent clay. Thickness ranges from 8 to 14 inches. Base saturation ranges from 75 to 100 percent.

The B2t horizon has value of 3 to 6 when dry and 3 to 5 when moist, chroma of 3 to 6 when dry and 3 or 4 when moist, and hue of 7.5YR or 5YR. This horizon is 27 to 35 percent clay.

Pit series

The Pit series consists of very deep, poorly drained soils on flood plains. These soils formed in alluvium derived from extrusive igneous rock. Slope ranges from 0 to 2 percent.

Typical pedon of Pit clay, 225 feet east and 950 feet north of the southwest corner of sec. 9, T. 44 N., R. 6 W.

A11—0 to 2 inches; dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium platy structure; very hard, firm, sticky and very plastic; many very fine, fine, and medium roots; few fine and very fine tubular pores; mildly alkaline; abrupt smooth boundary.

A12—2 to 20 inches; dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong coarse prismatic structure parting to strong fine angular blocky; very hard, very firm, sticky and very plastic; many medium roots and common fine and very fine roots; common very fine tubular pores; cracks 1/2 inch wide in lower part; many intersecting slickensides; mildly alkaline; clear wavy boundary.

A13ca—20 to 38 inches; dark gray (10YR 4/1) clay, very dark brown (10YR 2/2) moist; strong medium prismatic structure parting to strong fine angular blocky; very hard, very firm, sticky and very plastic; many medium roots and common fine and very fine roots; common fine and very fine tubular pores; common intersecting slickensides; seams and soft masses of lime; violently effervescent; moderately alkaline; abrupt wavy boundary.

C1ca—38 to 44 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and very plastic; few fine and very fine roots; common fine vesicular pores and few fine tubular pores; seams and soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C2ca—44 to 49 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and very plastic; few very fine roots; common fine vesicular pores and very fine tubular pores; seams and soft masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C3—49 to 61 inches; pale brown (10YR 6/3) clay loam, yellowish brown (10YR 5/4) moist; few fine distinct dark yellowish brown (10YR 4/4) mottles, dark yellowish brown (10YR 3/4) moist; massive; hard, firm, sticky and very plastic; common fine vesicular pores and common very fine tubular pores; mildly alkaline.

Cracks 1 to 5 centimeters wide extend to a depth of 20 to 24 inches when the soils are dry. The water table is at a depth of 24 to 36 inches from December through May.

The upper part of the A horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 0 or 1, and hue of 10YR or neutral. It is neutral or mildly alkaline. The lower part has value of 4 to 5 when dry and 2 or 3 when moist. It is mildly alkaline or moderately alkaline. Slickensides intersect in the lower part of the A horizon.

The C horizon has value of 5 or 6 when dry and chroma of 2 or 3 when dry. Reaction is mildly alkaline or moderately alkaline. This horizon is clay loam or silty clay loam and is 30 to 40 percent clay.

Plutos series

The Plutos series consists of moderately deep, somewhat excessively drained soils on glacial fans. These soils formed in glaciofluvial deposits weathered from extrusive igneous rock and volcanic ash. Slope ranges from 0 to 30 percent.

Typical pedon of a Plutos loamy sand in an area of Plutos-Rock outcrop complex, 0 to 30 percent slopes; 2,400 feet east and 200 feet south of the northwest corner of sec. 26, T. 43 N., R. 4 W.

A11—0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; loose; few very fine and fine roots; many fine interstitial pores; 5 percent fine and medium pumice pebbles 2 to 30 millimeters in diameter; medium acid; abrupt smooth boundary.

A12—3 to 7 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; very weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; few fine tubular pores and many fine interstitial pores; 10 percent fine and medium pumice pebbles 2 to 30 millimeters in diameter; medium acid; abrupt smooth boundary.

AC—7 to 14 inches; light brownish gray (2.5Y 6/2) sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and many medium and coarse roots; many fine interstitial pores; 10 percent fine and medium pumice pebbles 2 to 30 millimeters in diameter; medium acid; abrupt smooth boundary.

C—14 to 23 inches; pale brown (10YR 6/3) sand, dark brown (10YR 3/3) moist; massive; soft, very friable,

nonsticky and nonplastic; few very fine and fine roots and common medium and coarse roots; few fine tubular pores and many fine interstitial pores; 10 percent pebbles; neutral; abrupt smooth boundary.

IIR—23 inches; vesicular hard basalt; high olivine content; highly fractured.

Depth to fractured basalt ranges from 20 to 40 inches. Thickness of the solum ranges from 11 to 20 inches. The profile is 2 to 15 percent rock fragments and 3 to 8 percent clay. Reaction is medium acid to neutral. Base saturation is 60 to 75 percent in some part of the upper 10 to 30 inches of the profile. Content of organic matter ranges from 0.5 to 0.9 percent in the upper 7 inches of the profile.

The A1 horizon has value of 5 or 6 when dry and hue of 10YR or 2.5Y. Thickness ranges from 5 to 10 inches. Where the A1 horizon is dark, it lacks either the organic matter content or thickness to qualify it as a mollic epipedon.

The C horizon has value of 5 or 6 when dry and 2 or 3 when moist, chroma of 2 or 3, and hue of 10YR to 2.5Y. It is sand or loamy sand.

Ponto series

The Ponto series consists of very deep, well drained soils on hills. These soils formed in volcanic ash. Slope ranges from 2 to 50 percent.

Typical pedon of a Ponto sandy loam in an area of Ponto-Neer complex, 2 to 15 percent slopes; 1,600 feet north and 860 feet east of the southwest corner of sec. 35, T. 40 N., R. 4 W.

O1&O2—1 inch to 0; undecomposed and partially decomposed needles, leaves, bark, and other organic debris.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam, black (N 2/0) moist; very weak medium platy structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial and vesicular pores; 5 percent fine pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt smooth boundary.

A12—3 to 8 inches; brown (7.5YR 5/4) sandy loam, very dark grayish brown (10YR 3/2) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine interstitial and vesicular pores; 5 percent fine pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt smooth boundary.

B21—8 to 21 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and many medium and coarse roots; common very fine and fine vesicular pores; 10 percent fine pebbles 2 to 5 millimeters in diameter; weakly smeary; strongly acid; abrupt wavy boundary.

B22—21 to 26 inches; pink (7.5YR 7/4) light sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, slightly firm, nonsticky and nonplastic; few very fine and fine roots and many medium and coarse roots; common very fine and fine vesicular pores; 10 percent fine pebbles; weakly smeary; very strongly acid; abrupt wavy boundary.

B3—26 to 53 inches; very pale brown (10YR 7/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, slightly firm, nonsticky and nonplastic; few very fine and fine roots and many medium roots; 5 percent fine pebbles; weakly smeary; very strongly acid; abrupt smooth boundary.

Cg—53 to 80 inches; light brown (7.5YR 6/4) stony sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine vesicular pores; 10 percent fine pebbles and 10 percent stones; weakly smeary; very strongly acid.

A few stones are on the surface in places. Thickness of the solum ranges from 42 to 62 inches. Bulk density ranges from 0.5 to 0.95 gram per cubic centimeter to a depth of 10 to 30 inches but is 0.85 gram or more at a depth of 10 to 14 inches.

The A1 horizon has value of 3 to 5 when dry and 2 or 3 when moist, chroma of 2 to 4 when dry and 0 to 4 when moist, and hue of 10YR, 7.5YR, or neutral. Reaction is strongly acid or medium acid. Base saturation ranges from 15 to 40 percent. The A1 horizon is sandy loam or stony sandy loam. It is 6 to 15 percent clay and 0 to 35 percent rock fragments. Thickness ranges from 6 to 9 inches.

The B2 horizon has value of 5 to 7 when dry and 3 or 4 when moist, chroma of 3, 4, or 6, and hue of 10YR or 7.5YR. Reaction is very strongly acid to medium acid. The B2 horizon is sandy loam or loam. It is 8 to 18 percent clay and 5 to 15 percent rock fragments. Base saturation is 10 to 30 percent.

The C horizon has value of 5 to 7 when dry and 4 or 5 when moist, chroma of 4 or 6, and hue of 10YR, 7.5YR, or 5YR. It is stony sandy loam or stony loam. This horizon is 10 to 18 percent clay and 15 to 35 percent rock fragments.

Redola series

The Redola series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 9 percent.

Typical pedon of Redola loam, 0 to 2 percent slopes; 650 feet west and 50 feet north of the southeast corner of sec. 4, T. 43 N., R. 4 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; mildly alkaline; abrupt smooth boundary.
A12—6 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and coarse roots and many fine roots; common fine tubular pores; moderately alkaline; clear smooth boundary.
A13—13 to 19 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and coarse roots and many medium roots; common fine tubular pores; moderately alkaline; abrupt smooth boundary.
C1—19 to 33 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; many medium roots; moderately alkaline; abrupt smooth boundary.
C2ca—33 to 39 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; common fine tubular pores; strongly effervescent; strongly alkaline; abrupt wavy boundary.
IIC3ca—39 to 60 inches; gray (10YR 6/1) gravelly sand, very dark grayish brown (10YR 3/2); single grain; loose; strongly effervescent; strongly alkaline.

Thickness of the solum ranges from 15 to 30 inches. The profile is either stratified or it has a buried A horizon. Content of clay in the 10- to 40-inch control section ranges from 7 to 18 percent by weighted average.

The A1 horizon has value of 4 or 5 when dry and chroma of 2 or 3. It is mildly alkaline or moderately alkaline. The A horizon is noncalcareous.

The C horizon has chroma of 1 to 3 and hue of 2.5Y or 10YR. It is moderately alkaline or strongly alkaline. The C horizon is 0 to 35 percent coarse fragments. In some pedons it has discontinuous seams of lime that are weakly cemented.

The soils in the Redola series, as mapped in this survey area, do not have carbonates in the upper 25 to 40 inches of the profile, have thin clay loam strata, and are strongly alkaline in the C horizon. These properties are outside the accepted range of characteristics for the Redola series, but they do not significantly affect the use and management of the soils.

Salisbury series

The Salisbury series consists of well drained soils on terraces. These soils are moderately deep to a hardpan. They formed in mixed alluvium. Slope ranges from 0 to 9 percent.

Typical pedon of Salisbury cobbly loam, 0 to 9 percent slopes; 1,875 feet east and 100 feet south of the northwest corner of sec. 8, T. 44 N., R. 5 W.

A11—0 to 2 inches; gray (10YR 5/1) cobbly loam, very dark brown (10YR 2/2) moist; strong medium platy structure; hard, friable, sticky and plastic; many very fine and fine roots; common fine and medium vesicular pores; 10 percent cobbles and 10 percent pebbles; mildly alkaline; abrupt smooth boundary.
A12—2 to 4 inches; gray (10YR 5/1) cobbly loam, very dark brown (10YR 2/2) moist; strong medium platy structure; very hard, friable, sticky and plastic; common very fine and fine roots; common fine interstitial pores and few very fine and fine tubular pores; 10 percent cobbles and 10 percent pebbles; mildly alkaline; abrupt smooth boundary.
B21t—4 to 8 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure parting to strong fine prismatic; very hard, firm, sticky and very plastic; few very fine and fine roots; common very fine tubular pores; continuous thin clay films on peds and lining pores; 2 percent stones, 3 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.
B22t—8 to 14 inches; dark grayish brown (10YR 4/2) gravelly clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; common thick clay films and continuous moderately thick clay films on peds and lining pores; 2 percent stones, 3 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.
B23t—14 to 24 inches; dark brown (10YR 4/3) gravelly clay, dark brown (10YR 3/3) moist; strong medium prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; 2 percent stones, 3 percent cobbles, and 10 percent pebbles; neutral; clear smooth boundary.
C1sim—24 to 32 inches; very strongly silica cemented duripan; some white segregated lime in seams; 2 to 3 percent pebbles and cobbles in the pan.
C2—32 to 60 inches; stratified sand, gravel, cobbles, and stones.

A few cobbles are on the surface in places. Depth to the duripan ranges from 20 to 40 inches. Content of organic matter ranges from 1 to 2 percent in the upper 11 inches of the profile.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 1 to 3 when dry and 2 or 3 when moist. Reaction is neutral or mildly alkaline. This horizon is clay loam, gravelly clay loam, or cobbly loam. It is 20 to 35 percent clay and 0 to 35 percent rock fragments. Thickness ranges from 4 to 8 inches.

The B2t horizon has value of 4 to 6 when dry and 2 to 4 when moist, chroma of 2 to 4, and hue of 10YR or 7.5YR. It is neutral to moderately alkaline. This horizon is clay or clay loam. It is 40 to 50 percent clay and 5 to 35 percent rock fragments.

The Csim horizon ranges from 6 to 36 inches in thickness.

Settlemeyer series

The Settlemeyer series consists of very deep, poorly drained soils on flood plains. These soils formed in mixed alluvium. Slope ranges from 0 to 5 percent.

Typical pedon of Settlemeyer loam, 0 to 2 percent slopes; 1,300 feet east and 1,080 feet south of the northwest corner of sec. 3, T. 44 N., R. 6 W.

A11—0 to 2 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common very fine and fine roots; common fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A12—2 to 10 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common very fine and fine roots; common fine tubular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A13—10 to 11 inches; gray (10YR 5/1) fine sandy loam, very dark gray (10YR 3/1) moist; few fine distinct pale brown (10YR 6/3) mottles; very weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; few very fine interstitial pores; disseminated lime in pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

A14—11 to 17 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; few fine distinct pale brown (10YR 6/3) mottles; massive; hard, friable, sticky and plastic; common very fine and fine roots; common fine tubular pores; disseminated lime in pores, slightly effervescent; moderately alkaline; abrupt smooth boundary.

A15t—17 to 22 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; massive; hard, friable, sticky and plastic; common very fine and fine roots; common fine and medium tubular pores; lime in pores; noncalcareous in matrix; slightly effervescent; moderately alkaline; clear smooth boundary.

A16—22 to 36 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; massive; hard, friable, sticky and plastic; common very fine and fine roots; common fine tubular pores; moderately alkaline; gradual smooth boundary.

C—36 to 44 inches; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots; few fine tubular pores; moderately alkaline; gradual smooth boundary.

A11b—44 to 53 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; massive; hard, firm, sticky and plastic; moderately alkaline; gradual smooth boundary.

IIA12b—53 to 66 inches; gray (10YR 5/1) sandy clay loam, very dark gray (10YR 3/1) moist; massive; hard, firm, sticky and plastic; moderately alkaline.

Thickness of the solum ranges from 32 to 38 inches. The textural control section is strata of loam, silt loam, fine sandy loam, silty clay loam, clay, or clay loam. It averages from 18 to 35 percent clay. The profile is either stratified or it has a buried A horizon or a buried C horizon, or both. Reaction is mildly alkaline or moderately alkaline. The water table is at the surface from December through June, and it fluctuates between depths of 12 and 24 inches the rest of the year unless the soils are artificially drained. Organic carbon content is 0.6 to 1.2 percent in the upper 11 inches of the profile, and it decreases irregularly with increasing depth. The upper part of the A horizon is calcareous, but some parts of the profile at a depth of 10 to 20 inches are noncalcareous.

The A1 and IIA1b horizons have value of 4 or 5 when dry and 2 or 3 when moist, and they have chroma of 1 or 2. The A1 horizon is 18 to 27 percent clay, and the IIA1b horizon is 18 to 35 percent clay.

The C horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 1 to 3, and hue of 2.5Y or 10YR.

Settlemeyer Variant

The Settlemeyer Variant consists of very deep, poorly drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 2 percent.

Typical pedon of Settlemeyer Variant silt loam, 550 feet south and 880 feet east of the northwest corner of sec. 25, T. 43 N., R. 9 W.

A11—0 to 11 inches; very dark gray (N 3/0) silt loam, black (N 2/0) moist; moderate medium platy structure; very hard, friable, very sticky and very plastic; many fine roots; moderately alkaline; abrupt smooth boundary.

A12—11 to 19 inches; dark gray (N 4/0) silt loam, very dark gray (N 3/0) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; many fine roots; moderately alkaline; clear smooth boundary.

B21tg—19 to 32 inches; dark gray (5Y 4/1) silty clay loam, very dark gray (5Y 3/1) moist; black (5Y 2/1, moist) and olive gray (5Y 4/2, moist) mottles; strong medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; common fine and medium roots; common fine tubular pores; many moderately thick

clay films in pores and on peds; moderately alkaline; clear smooth boundary.

B22tg—32 to 53 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 5/2) moist; common medium distinct light olive brown (2.5Y 5/6) and olive (5Y 5/3) mottles; strong medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, very sticky and very plastic; few medium and fine roots; few fine tubular pores; many moderately thick clay films in pores and on peds; moderately alkaline; clear smooth boundary.

B23tg—53 to 68 inches; olive gray (5Y 5/2) silty clay loam, olive gray (5Y 4/2) moist; many medium and large distinct olive brown (2.5Y 4/4) and olive gray (5Y 4/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and very plastic; few medium roots; few fine tubular pores; many moderately thick clay films in pores and on peds; moderately alkaline; abrupt smooth boundary.

Cg—68 to 80 inches; greenish gray (5BG 6/1, moist) gravelly clay loam, massive; hard, firm, very sticky and very plastic; 30 percent fine and medium pebbles; strongly alkaline.

The water table is at a depth of 0 to 18 inches from February through June, and it fluctuates between depths of 18 and 36 inches the rest of the year. The profile is mildly alkaline to strongly alkaline throughout.

The A1 horizon has value of 2 to 4 when dry, chroma of 0 or 1, and hue of 2.5Y, 10YR, or neutral. It is 20 to 27 percent clay. Organic matter content ranges from 2 to 4 percent. Thickness ranges from 16 to 25 inches.

The B2tg horizon has value of 4 to 6 when dry, chroma of 0 to 2, and hue of 2.5Y, 5Y, 10YR, or neutral. It is silty clay loam, clay loam, or clay and averages 35 to 45 percent clay.

Sheld series

The Sheld series consists of deep, well drained soils on mountains. These soils formed in volcanic ash deposited over material weathered from extrusive igneous rock (fig. 9). Slope ranges from 9 to 65 percent.

Typical pedon of a Sheld stony sandy loam in an area of Sheld-Iller stony sandy loams, 30 to 50 percent slopes; 2,600 feet south and 145 feet east of the northwest corner of sec. 29, T. 44 N., R. 3 W.

O1&O2—2 inches to 0; undecomposed and partially decomposed needles, leaves, twigs, bark, and other organic debris.

A11—0 to 2 inches; dark brown (10YR 4/3) stony sandy loam, dark reddish brown (5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 10 percent pebbles, 5 percent cobbles, and 4 percent

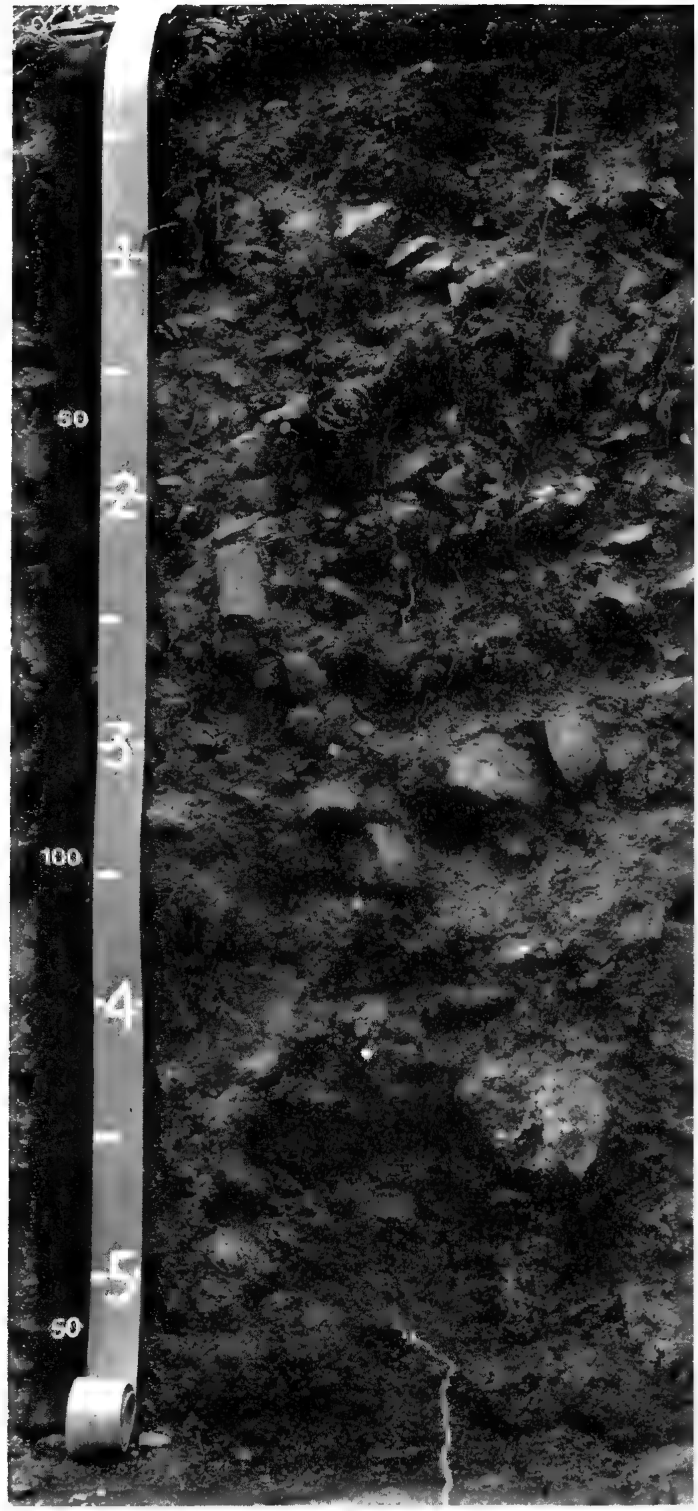

Figure 9—Typical profile of a Sheld stony sandy loam in an area of Sheld-Iller stony sandy loams, 30 to 50 percent slopes. Tape measure on right gives depth in feet, and that on left gives depth in centimeters

stones; weakly smeary; strongly acid; clear smooth boundary.

A12—2 to 7 inches; brown (10YR 5/3) stony sandy loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 10 percent pebbles, 5 percent cobbles, and 4 percent stones; weakly smeary; slightly acid; clear wavy boundary.

A13—7 to 19 inches; brown (7.5YR 5/2) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and medium roots; many very fine and fine random interstitial pores; 20 percent pebbles, 5 percent cobbles, and 2 percent stones; weakly smeary; slightly acid; gradual irregular boundary.

B21t—19 to 27 inches; brown (7.5YR 5/2) very gravelly sandy loam, dark reddish brown (5YR 3/3) moist; very weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; few very fine and fine tubular pores; 40 percent pebbles, 5 percent cobbles, and 5 percent stones; moderately smeary; medium acid; gradual wavy boundary.

B22t—27 to 33 inches; reddish gray (5YR 5/2) very gravelly sandy loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many medium roots and common very fine and fine roots; few very fine and fine tubular pores; few thin clay films in pores and on peds; 40 percent pebbles, 5 percent cobbles, and 5 percent stones; moderately smeary; medium acid; clear wavy boundary.

IIB23tb—33 to 40 inches; reddish gray (5YR 5/2) very gravelly loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many medium roots and common very fine roots; few very fine and fine tubular pores; common thin clay films in pores and on peds; 40 percent pebbles, 5 percent cobbles, and 5 percent stones; medium acid; clear wavy boundary.

IIB24tb—40 to 46 inches; weak red (2.5YR 5/2) very gravelly loam, dark reddish brown (2.5YR 2/4) moist; weak fine subangular blocky structure; hard, slightly firm, sticky and plastic; common very fine and fine roots and many medium roots; few very fine and fine tubular pores; common thin clay films in pores and on peds; 40 percent pebbles, 5 percent cobbles, and 5 percent stones; medium acid; clear wavy boundary.

IICr—46 inches; weak red (2.5YR 5/2) weathered rock, dark reddish brown (2.5YR 2/4) moist; about 60 percent saprolite and 30 percent hard andesite; soil material in cracks and seams.

A few to many stones are on the surface. Depth to weathered rock ranges from 40 to 60 inches. Bulk density ranges from 0.6 to 1 gram per cubic centimeter to a depth of 10 to 20 inches. It is 0.85 or more at a depth of 10 to 14 inches.

The A horizon has value of 2 or 3 when moist, chroma of 2 to 4 when dry, and hue of 10YR, 7.5YR, or 5YR. Reaction is strongly acid to slightly acid. This horizon is stony sandy loam or very stony sandy loam. It is 5 to 10 percent clay and 15 to 45 percent rock fragments. Base saturation ranges from 40 to 60 percent, but it is less than 50 percent in at least part of the upper 10 inches. The sodium fluoride reaction ranges from 9.8 to 10.6.

The B2t horizon has value of 5 or 6 when dry and 3 or 4 when moist, chroma of 2 to 4 when dry, and hue of 7.5YR or 5YR. Reaction is slightly acid or medium acid. This horizon is very gravelly sandy loam or very gravelly loam. It is 6 to 12 percent clay. The B2t horizon is 35 to 60 percent rock fragments. The IIB2tb horizon has value of 5 or 6 when dry and 2 to 5 when moist, chroma of 2 to 4 when dry or moist, and hue of 7.5YR, 5YR, or 2.5YR. Reaction is slightly acid to strongly acid. This horizon is very gravelly sandy loam or very gravelly loam. It is 35 to 60 percent rock fragments.

Snell series

The Snell series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from extrusive igneous rock. Slope ranges from 5 to 30 percent.

Typical pedon of Snell very stony loam, 5 to 30 percent slopes; 1,200 feet north and 1,200 feet west of the southeast corner of sec. 20, T. 45 N., R. 2 W. (outside the survey area).

A11—0 to 2 inches; grayish brown (10YR 5/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; 25 percent cobbles and stones and 10 percent pebbles; slightly acid; abrupt smooth boundary.

A12—2 to 4 inches; grayish brown (10YR 5/2) very stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; 20 percent cobbles and stones and 15 percent pebbles; slightly acid; abrupt smooth boundary.

B1t—4 to 7 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; many fine interstitial pores and few fine tubular pores; many sand grains bridged with clay; 20 percent cobbles and 15 percent pebbles; slightly acid; clear smooth boundary.

B21t—7 to 10 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, firm, sticky and very plastic; common very fine and fine roots; many fine interstitial pores and few fine tubular pores; few thin clay films lining pores and many sand grains bridged with clay; 20 percent cobbles and 15 percent pebbles; slightly acid; abrupt wavy boundary.
B22t—10 to 21 inches; brown (10YR 5/3) very cobbly clay, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores; many moderately thick clay films on peds and lining pores; 30 percent cobbles and stones and 25 percent pebbles; slightly acid; abrupt wavy boundary.
R—21 inches; fractured andesite.

Depth to andesite ranges from 20 to 40 inches. The profile is 35 to 60 percent rock fragments. Reaction of the solum is slightly acid or neutral.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist. It is 20 to 27 percent clay. Thickness is 4 to 11 inches.

The Bt horizon has value of 4 or 5 when dry, chroma of 2 or 3, and hue of 10YR to 7.5YR. It averages 35 to 45 percent clay.

Stoner series

The Stoner series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium. Slope ranges from 0 to 15 percent.

Typical pedon of Stoner gravelly sandy loam, 5 to 15 percent slopes; 1,800 feet west and 2,500 feet south of the northeast corner of sec. 5, T. 41 N., R. 8 W.

A11—0 to 1 inch; brown (10YR 3/4, 5/3) gravelly sandy loam, dark brown (10YR 3/3) rubbed and moist; faces of peds are dark brown (10YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 25 percent fine and medium pebbles; medium acid; abrupt smooth boundary.
A12—1 inch to 3 inches; brown (10YR 5/3) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine tubular pores and few medium tubular pores; 25 percent fine and medium pebbles; medium acid; abrupt smooth boundary.
A13—3 to 12 inches; brown (10YR 5/3) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine and very fine roots; many fine tubular pores; few thin clay films in pores; 17 percent fine and medium pebbles; medium acid; abrupt smooth boundary.
B21t—12 to 21 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; very weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; many fine tubular pores; few thin clay films in pores and on peds; 18 percent fine and medium pebbles; medium acid; clear smooth boundary.
B22t—21 to 27 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) rubbed and moist; faces of peds are yellowish brown (10YR 5/6) moist; very weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; many thin clay films and common moderately thick clay films in pores and on peds; 17 percent fine and medium pebbles; medium acid; clear smooth boundary.
B23t—27 to 36 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/6) rubbed and moist; faces of peds are dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; many thin clay films and common moderately thick clay films in pores and on peds; 20 percent fine and medium pebbles; medium acid; abrupt smooth boundary.
IIB24t—36 to 60 inches; strong brown (7.5YR 5/6) very gravelly loam, yellowish brown (10YR 5/8) moist; massive; hard, firm, very sticky and plastic; few fine roots; few fine tubular pores; many moderately thick clay films in pores; 55 percent pebbles; medium acid.

The 10- to 40-inch control section averages 15 to 35 percent rock fragments. The solum is medium acid or slightly acid.

The A horizon has value of 4 to 6 when dry, chroma of 2 or 3 when dry and 2 to 4 when moist, and hue of 10YR or 7.5YR. It is 8 to 17 percent clay. Thickness ranges from 11 to 16 inches.

The B2t horizon has value of 5 to 7 when dry and 3 to 5 when moist, chroma of 3, 4, or 6 when dry or moist, and hue of 10YR or 7.5YR. This horizon is gravelly sandy loam or gravelly loam. It is 9 to 18 percent clay. The IIB2 horizon is very gravelly loam or very gravelly sandy loam. It is 35 to 60 percent rock fragments.

Terwilliger series

The Terwilliger series consists of moderately deep, well drained soils on hills. These soils formed in residuum derived from siltstone. Slope ranges from 2 to 50 percent.

Typical pedon of Terwilliger stony silty clay loam, 2 to 50 percent slopes; 2,190 feet north and 2,540 feet west of the southeast corner of sec. 19, T. 46 N., R. 5 W.

A11—0 to 2 inches; light brownish gray (2.5Y 6/2) stony silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; hard, friable, sticky and plastic; many very fine and fine roots; common very fine tubular pores; 3 percent stones, 2 percent cobbles, and 5 percent pebbles; slightly acid; abrupt smooth boundary.

A12—2 to 6 inches; light brownish gray (2.5Y 6/2) stony silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate thick platy structure; very hard, friable, sticky and very plastic; common very fine and fine roots; few very fine tubular pores; 3 percent stones, 2 percent cobbles, and 5 percent pebbles; slightly acid; abrupt smooth boundary.

B1t—6 to 13 inches; pale brown (10YR 6/3) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many thin clay films on peds and lining pores; 1 percent stones, 3 percent cobbles, and 5 percent pebbles; neutral; clear smooth boundary.

B21t—13 to 19 inches; light olive brown (2.5Y 5/4) silty clay loam, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many thin clay films on peds and lining pores; 1 percent stones, 2 percent cobbles, and 5 percent pebbles; neutral; abrupt wavy boundary.

B22t—19 to 30 inches; light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) rubbed and moist; faces of peds are olive brown (2.5Y 3/4) moist; strong coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; continuous pressure faces or thin clay films on peds and lining pores; 1 percent cobbles and 5 percent pebbles; neutral; abrupt wavy boundary.

B3t—30 to 34 inches; olive (5Y 5/4) gravelly silty clay, light olive brown (2.5Y 5/4) rubbed and moist; faces of peds are olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; continuous pressure faces or thin and moderately thick clay films on peds and lining pores; 20 percent fine and medium siltstone pebbles; moderately alkaline; abrupt wavy boundary.

Cr—34 inches; weathered massive siltstone.

A few stones are on the surface in places. Depth to weathered siltstone ranges from 20 to 40 inches.

The A horizon has value of 5 or 6 when dry, chroma of 2 or 3, and hue of 5Y or 2.5Y. Reaction is slightly acid or neutral. This horizon is stony silty clay loam or silty clay loam. It is 27 to 35 percent clay and 0 to 35 percent rock fragments. Thickness ranges from 3 to 7 inches.

The B2t horizon has chroma of 2 to 4 and hue of 5Y, 2.5Y, or 10YR. Reaction is neutral or mildly alkaline. This horizon averages 35 to 50 percent clay and is 0 to 15 percent rock fragments.

The B3t horizon is neutral to moderately alkaline. It is 15 to 35 percent rock fragments.

Uhlig Variant

The Uhlig Variant consists of deep, well drained soils on terrace escarpments. These soils formed in alluvium weathered from extrusive igneous rock. Slope ranges from 5 to 50 percent.

Typical pedon of Uhlig Variant stony loam, 5 to 50 percent slopes; 1,600 feet north and 100 feet east of the southwest corner of sec. 27, T. 42 N., R. 5 W.

O1&O2—1 inch to 0; partially decomposed and undecomposed twigs, bark, leaves, and other organic debris.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) moist; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular pores; 7 percent pebbles and 20 percent stones and cobbles; medium acid; abrupt smooth boundary.

A12—2 to 4 inches; dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; few fine tubular pores and common very fine tubular pores; 7 percent pebbles and 20 percent cobbles and stones; medium acid; clear smooth boundary.

A13—4 to 14 inches; dark grayish brown (10YR 4/2) stony loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and many medium roots; few fine tubular pores; 7 percent pebbles and 20 percent cobbles and stones; medium acid; clear smooth boundary.

B21t—14 to 24 inches; pale brown (10YR 6/3) stony loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots and many medium roots; few fine and very fine tubular pores; few thin clay films in pores; 6 percent pebbles and 20 percent cobbles and stones; medium acid; clear smooth boundary.

B22t—24 to 38 inches; pale brown (10YR 6/3) stony loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly

plastic; few fine roots and many medium roots; few fine tubular pores and common very fine tubular pores; few thin clay films on peds and common thin films in pores; 7 percent pebbles and 20 percent cobbles and stones; medium acid; clear smooth boundary.

B3t—38 to 42 inches; pale brown (10YR 6/3) stony loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots and many medium roots; few fine tubular pores and common very fine tubular pores; common thin clay films on peds and in pores; 6 percent pebbles and 30 percent cobbles and stones; medium acid; abrupt wavy boundary.

Cr—42 inches; weathered tuff.

Depth to weathered tuff ranges from 40 to 60 inches. The profile is 20 to 35 percent rock fragments. The solum is medium acid or slightly acid. A few stones are on the soil surface. Content of organic matter ranges from 1 to 2 percent in the upper 7 inches and decreases to less than 1 percent at a depth of 20 inches.

The A horizon has value of 3 or 4 when dry and chroma of 2 or 3. It is 10 to 16 percent clay. Thickness ranges from 12 to 18 inches.

The B2t horizon has value of 3 to 6 when dry and 3 to 5 when moist, and it has chroma of 3 or 4 when dry and 2 to 4 when moist. The B2t horizon is stony loam or stony sandy loam. It averages 12 to 18 percent clay.

Weitchpec Variant

The Weitchpec Variant consists of shallow, well drained soils on mountains. These soils formed in residuum derived from serpentine. Slope ranges from 5 to 65 percent.

Typical pedon of a Weitchpec Variant gravelly loam in an area of Weitchpec Variant-Rock outcrop complex, 5 to 65 percent slopes; 1,351 feet west and 1,126 feet north of the southeast corner of sec. 25, T. 44 N., R. 8 W.

A1—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; slightly acid; abrupt smooth boundary.

B21t—4 to 8 inches; grayish brown (10YR 5/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many fine and very fine tubular pores; few thin clay films on peds; 25 percent pebbles and 5 percent cobbles; slightly acid; clear smooth boundary.

B22t—8 to 16 inches; grayish brown (10YR 5/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; common fine roots; common fine tubular pores; many thin clay films in pores and on peds; 30 percent pebbles and 15 percent cobbles and stones; neutral; abrupt wavy boundary.

R—16 inches; hard serpentine.

Depth to serpentine ranges from 10 to 20 inches. The solum is slightly acid or neutral.

The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3 when dry. It is 20 to 27 percent clay. Organic matter content is 1 to 2 percent. This horizon is 15 to 35 percent rock fragments. Thickness ranges from 2 to 6 inches.

The B2t horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3 when dry. It is 30 to 35 percent clay and averages 35 to 60 percent rock fragments.

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glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	More than 10.0

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by oil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from

that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly

nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.
Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.
Root zone. The part of the soil that can be penetrated by plant roots.
Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.
Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.
Sandstone. Sedimentary rock containing dominantly sand-size particles.
Saprolite. (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil science, saprolite is any unconsolidated residual material underlying the soil and grading to hard bedrock below.
Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.
Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.
Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.
Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
Silica. A combination of silicon and oxygen. The mineral form is called quartz.
Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.
Siltstone. Sedimentary rock made up of dominantly silt-sized particles.
Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.
Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.
Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.
Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized—

	Percent slope
Nearly level	0 to 2
Gently sloping	2 to 5
Moderately sloping	5 to 9
Strongly sloping	9 to 15
Moderately steep	15 to 30
Steep	30 to 50
Very steep	More than 50

Slow intake (in tables). The slow movement of water into the soil.
Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.
Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.
Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium absorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	Less than 13.1
Moderate	13-30.1
Strong	More than 30 1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1 0
Coarse sand	1 0 to 0.5
Medium sand	0 5 to 0 25
Fine sand	0 25 to 0 10
Very fine sand	0 10 to 0.05
Silt	0.05 to 0 002
Clay	less than 0 002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below the A horizon.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. Technically, the A horizon but excluding the A2 horizon. Generally, that part of the profile that is highest in content of organic matter and is darkest in color.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Underlying material. The part of the soil below the A or Ac horizon that is relatively unaffected by the processes of soil formation.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-77 at Fort Jones, California]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	43.2	23.8	33.5	60	.3	36	4.93	2.32	7.06	9	11.8
February---	51.7	26.6	39.2	69	9	71	2.74	.88	4.22	7	2.5
March------	56.9	28.4	42.7	74	15	118	2.04	.54	3.23	5	3.3
April------	64.4	31.5	48.0	83	19	262	1.01	.26	1.60	3	.3
May--------	73.4	37.3	55.4	93	23	477	.76	.11	1.25	3	.1
June-------	82.6	43.9	63.2	101	30	696	.77	---	1.34	2	.1
July-------	91.7	47.8	69.8	104	35	924	.31	---	.53	1	.0
August-----	89.9	46.3	68.1	104	35	871	.46	---	.77	2	.0
September--	84.2	39.2	61.7	99	25	651	.61	.05	1.02	1	.0
October----	70.6	32.2	51.4	92	18	353	1.39	.27	2.25	3	.0
November---	54.0	28.6	41.3	72	13	94	3.05	1.01	4.69	6	2.9
December---	43.2	25.6	34.4	60	5	50	4.65	1.69	7.02	8	8.8
Yearly:											
Average--	67.2	34.3	50.7	---	---	---	---	---	---	---	---
Extreme--	---	---	---	105	-5	---	---	---	---	---	---
Total	---	---	---	---	---	4,603	22.72	18.19	27.00	50	29.8

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-77 at Mount Shasta, California]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.1 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January---	41.9	25.5	33.7	61	5	21	6.93	2.92	10.17	10	36.3
February--	47.4	28.5	38.0	67	10	56	5.33	1.33	8.51	8	18.1
March-----	50.6	29.5	40.0	71	15	76	4.05	1.25	6.28	8	19.0
April-----	57.9	33.3	45.7	80	20	217	2.58	.68	4.10	5	9.7
May-------	67.0	39.7	53.4	88	26	420	1.59	.26	2.59	4	1.3
June------	75.6	46.6	61.1	95	32	633	.78	.12	1.30	3	.0
July------	85.3	50.8	68.0	98	38	868	.26	---	.43	1	.0
August----	83.5	49.2	66.4	98	37	818	.45	---	.78	1	.0
September-	77.7	44.5	61.1	95	31	633	767	.03	1.27	1	.0
October---	65.1	37.5	51.3	87	23	357	1.99	.34	3.25	3	.6
November--	50.8	31.2	41.1	73	16	92	5.50	1.58	8.63	7	12.1
December--	43.6	26.9	35.3	63	8	49	6.33	2.02	9.75	9	25.7
Yearly:											
Average-	62.2	36.9	49.6	---	---	---	---	---	---	---	---
Extreme-	---	---	---	99	4	---	---	---	---	---	---
Total---	---	---	---	---	---	4,240	36.55	28.36	44.26	60	122.8

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-77 at Yreka, California]

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average daily	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days[1]	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.1 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January---	43.1	24.4	33.8	59	4	34	3.71	1.73	5.32	7	8.6
February--	50.5	27.6	39.1	66	15	65	2.15	.70	3.30	5	2.3
March-----	54.7	29.9	42.3	74	18	111	1.84	.56	2.85	5	2.6
April-----	62.5	34.3	48.4	83	23	274	.84	.26	1.29	3	.7
May-------	72.0	40.7	56.4	94	27	508	.77	.22	1.20	3	.0
June------	80.9	48.1	64.5	100	34	735	.85	.14	1.39	3	.0
July------	90.7	53.3	72.0	104	40	992	.39	.02	.65	1	.0
August----	88.8	52.1	70.5	103	41	946	.58	---	1.00	2	.0
September-	82.5	45.6	64.1	99	33	723	.48	.05	.81	1	.0
October---	68.9	36.8	52.9	91	25	400	1.25	.24	2.03	3	.0
November--	53.4	30.5	41.9	73	15	94	2.38	.75	3.66	6	3.2
December--	44.1	26.1	35.1	60	9	38	3.99	1.39	6.07	7	6.1
Yearly:											
Average-	66.0	37.5	51.8	---	---	---	---	---	---	---	---
Extreme-	---	---	---	105	2	---	---	---	---	---	---
Total---	---	---	---	---	---	4,920	19.23	15.50	22.78	46	23.5

[1]A growing degree day is an index of the amount of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Recorded in the period 1951-77 at Fort Jones, California			
Last freezing temperature in spring:			
1 year in 10 later than--	May 21	June 1	June 22
2 years in 10 later than--	May 13	May 26	June 15
5 years in 10 later than--	April 27	May 14	June 3
First freezing temperature in fall:			
1 year in 10 earlier than--	September 26	September 16	August 21
2 years in 10 earlier than--	October 4	September 22	August 29
5 years in 10 earlier than--	October 4	October 2	September 15
Recorded in the period 1951-77 at Mount Shasta, California			
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 22	June 9
2 years in 10 later than--	April 26	May 15	June 4
5 years in 10 later than--	April 11	May 2	May 23
First freezing temperature in fall:			
1 year in 10 earlier than--	October 22	September 30	August 29
2 years in 10 earlier than--	October 29	October 7	September 8
5 years in 10 earlier than--	November 11	October 22	September 27

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Recorded in the period 1951-77 at Yreka, California			
Last freezing temperature in spring:			
1 year in 10 later than--	April 24	May 15	May 31
2 years in 10 later than--	April 16	May 9	May 25
5 years in 10 later than--	March 31	April 28	May 15
First freezing temperature in fall:			
1 year in 10 earlier than--	October 30	October 13	September 25
2 years in 10 earlier than--	November 5	October 18	September 30
5 years in 10 earlier than--	November 16	October 29	October 10

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
Recorded in the period 1951-77 at Fort Jones, California			
9 years in 10	140	114	70
8 years in 10	152	123	81
5 years in 10	174	140	103
2 years in 10	197	157	125
1 year in 10	209	166	136
Recorded in the period 1951-77 at Mount Shasta, California			
9 years in 10	180	144	93
8 years in 10	192	154	104
5 years in 10	214	172	126
2 years in 10	236	190	147
1 year in 10	247	199	159
Recorded in the period 1951-77 at Yreka, California			
9 years in 10	201	162	126
8 years in 10	211	169	133
5 years in 10	229	183	147
2 years in 10	248	197	161
1 year in 10	258	204	168

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
101	Asta gravelly sandy loam, 5 to 15 percent slopes	1,075	0.1
102	Asta gravelly sandy loam, 15 to 50 percent slopes	4,400	0.5
103	Asta cobbly sandy loam, 15 to 50 percent slopes	2,565	0.3
104	Atter very gravelly sandy loam, 0 to 5 percent slopes	2,475	0.3
105	Atter very cobbly sandy loam, 0 to 5 percent slopes	5,440	0.6
106	Atter very bouldery loamy fine sand, 5 to 30 percent slopes	780	0.1
107	Avis-Oosen complex, 5 to 30 percent slopes	8,625	1.0
108	Avis-Oosen complex, 30 to 50 percent slopes	2,195	0.2
109	Avis-Lava flows complex, 5 to 30 percent slopes	6,845	0.8
110	Bogus stony loam, 15 to 50 percent slopes	6,885	0.8
111	Bogus very stony loam, 15 to 50 percent slopes	4,010	0.5
112	Bonnet loam, 0 to 2 percent slopes	1,195	0.1
113	Bonnet gravelly loam, 0 to 2 percent slopes	3,275	0.4
114	Bonnet gravelly loam, 2 to 5 percent slopes	3,200	0.4
115	Boomer loam, cool, 5 to 30 percent slopes	2,190	0.2
116	Boomer, cool-Neuns complex, 30 to 70 percent slopes	560	0.1
117	Boomer Variant sandy loam, 30 to 50 percent slopes	2,050	0.2
118	Boomer Variant stony sandy loam, 5 to 30 percent slopes	575	0.1
119	Chaix-Chawanakee gravelly coarse sandy loams, 5 to 30 percent slopes	2,685	0.3
120	Chaix-Chawanakee gravelly coarse sandy loams, 30 to 50 percent slopes	8,280	0.9
121	Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes	11,540	1.3
122	Copsey clay, 0 to 9 percent slopes	1,010	0.1
123	Copsey gravelly clay, 2 to 9 percent slopes	2,260	0.3
124	Copsey cobbly clay, 2 to 9 percent slopes	1,265	0.1
125	Deetz gravelly loamy sand, 0 to 5 percent slopes	5,985	0.7
126	Deetz gravelly loamy sand, 5 to 15 percent slopes	3,810	0.4
127	Deetz stony loamy sand, 2 to 15 percent slopes	5,215	0.6
128	Deetz stony loamy sand, 15 to 30 percent slopes	1,710	0.2
129	Delaney sand, 0 to 9 percent slopes	4,155	0.5
130	Delaney gravelly sand, 0 to 9 percent slopes	2,880	0.3
131	Delaney stony sand, 0 to 15 percent slopes	2,390	0.3
132	Delaney sandy loam, 0 to 2 percent slopes	730	0.1
133	Delaney sandy loam, 2 to 5 percent slopes	1,025	0.1
134	Delaney Variant silt, 0 to 2 percent slopes	760	0.1
135	Deven-Rubble land complex, 0 to 30 percent slopes	4,980	0.6
136	Diyou loam	6,065	0.7
137	Diyou loam, drained	7,415	0.8
138	Diyou loam, peat substratum	600	0.1
139	Dotta loam, 0 to 2 percent slopes	1,815	0.2
140	Dotta loam, 2 to 9 percent slopes	2,170	0.2
141	Dotta gravelly loam, 0 to 2 percent slopes	1,930	0.2
142	Dotta gravelly loam, 2 to 5 percent slopes	1,870	0.2
143	Dubakella-Ipish complex, 5 to 30 percent slopes	2,980	0.3
144	Dubakella-Ipish complex, 30 to 50 percent slopes	8,350	0.9
145	Dumps	2,600	0.3
146	Duzel gravelly loam, 5 to 9 percent slopes	3,550	0.4
147	Duzel gravelly loam, 9 to 15 percent slopes	3,610	0.4
148	Duzel-Jilson-Facey complex, 15 to 50 percent slopes	87,785	9.8
149	Esro silt loam	1,265	0.1
150	Esro silt loam, drained	610	0.1
151	Etsel very gravelly loam, 30 to 75 percent slopes	4,940	0.6
152	Facey loam, 5 to 15 percent slopes	2,230	0.3
153	Gazelle silt loam	16,480	1.9
154	Gazelle Variant sandy clay loam	470	0.1
155	Hilt sandy loam, 2 to 15 percent slopes	3,770	0.4
156	Hilt sandy loam, 15 to 30 percent slopes	800	0.1
157	Hilt stony sandy loam, 2 to 50 percent slopes	1,725	0.2
158	Hilt-Rock outcrop complex, 2 to 50 percent slopes	5,310	0.6
159	Jenny clay, 0 to 2 percent slopes	350	*
160	Jenny clay, 2 to 15 percent slopes	4,410	0.5
161	Jenny cobbly clay, 0 to 15 percent slopes	1,940	0.2
162	Jilson gravelly loam, 50 to 65 percent slopes	2,790	0.3
163	Jilson-Duzel gravelly loams, 5 to 50 percent slopes	28,440	3.2
164	Kindig-Neuns gravelly loams, 15 to 50 percent slopes	3,380	0.4
165	Kindig-Neuns gravelly loams, 50 to 80 percent slopes	46,590	5.1
166	Kinkel very gravelly loam, 2 to 15 percent slopes	530	0.1
167	Kuck clay loam, 2 to 9 percent slopes	4,210	0.5
168	Kuck clay loam, 9 to 15 percent slopes	1,955	0.2

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
169	Lassen clay, 2 to 9 percent slopes	4,085	0.5
170	Lassen clay, 9 to 15 percent slopes	950	0.1
171	Lassen cobbly clay, 2 to 15 percent slopes	6,190	0.7
172	Lassen-Kuck complex, 15 to 50 percent slopes	2,300	0.3
173	Lassen-Kuck complex, stony, 2 to 50 percent slopes	46,410	5.1
174	Lassen-Rock outcrop-Kuck complex, 2 to 50 percent slopes	35,845	3.9
175	Lava flows	4,190	0.5
176	Lava flows-Xerorthents complex, 0 to 50 percent slopes	5,190	0.6
177	Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes	23,885	2.7
178	Lithic Xerorthents-Rock outcrop complex, 0 to 65 percent slopes	21,095	2.4
179	Louie loam, 0 to 2 percent slopes	2,940	0.3
180	Louie loam, 2 to 9 percent slopes	3,310	0.4
181	Louie stony loam, 0 to 9 percent slopes	6,500	0.7
182	Louie Variant sandy clay loam, 2 to 9 percent slopes	1,765	0.2
183	Marpa-Kinkel-Boomer, cool complex, 5 to 15 percent slopes	5,800	0.7
184	Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes	80,230	8.9
185	Mary loam, 2 to 9 percent slopes	1,340	0.2
186	Mary loam, 9 to 15 percent slopes	610	0.1
187	Mary stony loam, 2 to 50 percent slopes	16,280	1.8
188	Mary-Rock outcrop complex, 2 to 50 percent slopes	22,160	2.5
189	Medford clay loam, cool, 0 to 2 percent slopes	1,780	0.2
190	Medford clay loam, cool, 2 to 5 percent slopes	2,270	0.3
191	Medford clay loam, cool, 5 to 15 percent slopes	1,430	0.2
192	Montague clay, 0 to 2 percent slopes	1,630	0.2
193	Montague clay, 2 to 9 percent slopes	6,200	0.7
194	Montague cobbly clay, 0 to 9 percent slopes	1,880	0.2
195	Montague Variant clay, 0 to 9 percent slopes	660	0.1
196	Neer-Ponto stony sandy loams, 15 to 50 percent slopes	5,460	0.6
197	Neer-Ponto complex, 15 to 50 percent slopes	2,350	0.3
198	Odas sandy loam	2,320	0.3
199	Oosen loamy sand, 2 to 15 percent slopes	875	0.1
200	Orset sandy loam, 0 to 9 percent slopes	685	0.1
201	Pinehurst stony loam, 2 to 15 percent slopes	10,190	1.1
202	Pinehurst stony loam, 15 to 30 percent slopes	8,700	1.0
203	Pinehurst stony loam, 30 to 50 percent slopes	7,800	0.9
204	Pinehurst Variant very stony loam, 0 to 15 percent slopes	1,455	0.2
205	Pinehurst Variant very stony loam, 15 to 65 percent slopes	500	0.1
206	Pit clay	2,000	0.2
207	Plutos-Rock outcrop complex, 0 to 30 percent slopes	8,915	1.0
208	Ponto sandy loam, 5 to 15 percent slopes	1,350	0.2
209	Ponto-Neer complex, 2 to 15 percent slopes	5,370	0.6
210	Redola loam, 0 to 2 percent slopes	765	0.1
211	Redola loam, 2 to 9 percent slopes	1,905	0.2
212	Riverwash	3,540	0.4
213	Rock outcrop-Dubakella complex, 30 to 50 percent slopes	3,050	0.3
214	Rock outcrop-Louie complex, 0 to 15 percent slopes	8,010	0.9
215	Rock outcrop-Terwilliger complex, 2 to 50 percent slopes	1,375	0.2
216	Rock outcrop	16,685	1.9
217	Salisbury clay loam, 0 to 2 percent slopes	1,780	0.2
218	Salisbury clay loam, 2 to 9 percent slopes	2,770	0.3
219	Salisbury gravelly clay loam, 0 to 5 percent slopes	7,520	0.8
220	Salisbury gravelly clay loam, 5 to 9 percent slopes	5,380	0.6
221	Salisbury cobbly loam, 0 to 9 percent slopes	14,110	1.6
222	Settlemeyer loam, 0 to 2 percent slopes	13,430	1.5
223	Settlemeyer loam, drained, 2 to 5 percent slopes	2,440	0.3
224	Settlemeyer Variant silt loam	1,890	0.2
225	Sheld very stony sandy loam, 50 to 65 percent slopes	505	0.1
226	Sheld-Iller stony sandy loams, 9 to 30 percent slopes	9,790	1.1
227	Sheld-Iller stony sandy loams, 30 to 50 percent slopes	8,115	0.9
228	Snell very stony loam, 5 to 30 percent slopes	345	*
229	Stoner gravelly sandy loam, 0 to 2 percent slopes	6,505	0.7
230	Stoner gravelly sandy loam, 2 to 5 percent slopes	7,840	0.9
231	Stoner gravelly sandy loam, 5 to 15 percent slopes	3,535	0.4
232	Terwilliger silty clay loam, 2 to 9 percent slopes	945	0.1
233	Terwilliger silty clay loam, 9 to 15 percent slopes	255	*
234	Terwilliger silty clay loam, 15 to 50 percent slopes	985	0.1
235	Terwilliger stony silty clay loam, 2 to 50 percent slopes	2,795	0.3
236	Uhlig Variant stony loam, 5 to 50 percent slopes	1,230	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
237	Weitchpec Variant-Rock outcrop complex, 5 to 65 percent slopes	6,825	0.8
238	Xerofluvents, nearly level	1,695	0.2
	Water	4,900	0.6
	Total	887,765	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only soils suitable for these crops are listed]

Soil name and map symbol	Pasture	Barley	Grass-legume hay	Wheat	
	I	I	I	N	I
	AUM*	Ton	Ton	Ton	Ton
112, 113 Bonnet	11	2.0	5.0	0.75	2
114 Bonnet	11	2.0	5.0	0.75	2
122, 123 Copsey	15	---	5.0	---	---
129 Delaney	11	---	5.0	---	---
130 Delaney	7	---	4.0	---	---
132 Delaney	11	---	5.0	---	---
133 Delaney	11	---	5.0	---	---
134 Delaney Variant	11	---	5.5	---	---
136, 137 Diyou	10	1	5.0	---	2
139 Dotta	12	2	7.0	0.75	2
140 Dotta	12	2	7.0	0.75	2
141 Dotta	12	2	5.0	0.5	2
142 Dotta	12	2	5.0	0.5	2
152 Facey	11	2.0	5.5	0.75	2
153 Gazelle	8	---	4.0	---	---
154 Gazelle Variant	7	---	2.0	---	---
155, 156 Hilt	---	---	---	0.75	---
159 Jenny	11	2	5.5	0.75	2
160 Jenny	11	2	5.5	0.75	2
161 Jenny	10	1.5	5.5	0.50	1.5

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture	Barley	Grass-legume hay	Wheat	
	I	I	I	N	I
	AUM*	Ton	Ton	Ton	Ton
167, 168 Kuck	10	1.75	5	0.75	1.75
169, 170 Lassen	10	1.75	5	0.75	1.75
171 Lassen	8	1.25	4	0.5	1.25
179 Louie	10	1.75	5.0	---	1.75
180 Louie	10	1.75	5.0	---	1.75
185, 186 Mary	---	1.2	---	0.5	1.2
189 Medford	12	2.0	6.0	0.75	2.0
190 Medford	12	2.0	6.0	0.75	2.0
191 Medford	12	1.5	5.5	0.5	1.5
192 Montague	11	1.5	5.5	0.75	1.5
193 Montague	11	1	5.5	0.75	1
194 Montague	10	---	5.0	---	---
195 Montague Variant	10	---	5.0	---	---
206 Pit	10.0	---	5	0.75	2.0
210 Redola	11	2	5.5	0.75	2
211 Redola	11	2	5.5	0.75	2
217 Salisbury	10	1.75	5.0	0.5	1.75
218 Salisbury	10	1.75	5.0	0.5	1.75
219, 220 Salisbury	10	1.50	5.0	0.5	1.50
223 Settlemeyer	12	---	6	---	---
224 Settlemeyer Variant	10	---	5.0	---	---
229 Stoner	11	3.5	5.5	0.75	3.5

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF IRRIGATED AND NONIRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture	Barley	Grass-legume hay	Wheat	
	I	I	I	N	I
	AUM*	Ton	Ton	Ton	Ton
230------------------------ Stoner	11	3.5	5.5	0.75	3.5
231------------------------ Stoner	10	2	5.0	0.5	2
232------------------------ Terwilliger	8.0	1.25	4.0	0.5	1.25
233------------------------ Terwilliger	7.0	1	3.0	0.5	1.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--STORIE INDEX RATING

[The symbol < means less than]

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
101	Asta gravelly sandy loam, 5 to 15 percent slopes	95	60	90	90	46	3	Acidity.
102	Asta gravelly sandy loam, 15 to 50 percent slopes	95	60	50	90	26	4	Acidity.
103	Asta cobbly sandy loam, 15 to 50 percent slopes	95	50	50	90	21	4	Acidity.
104	Atter very gravelly sandy loam, 0 to 5 percent slopes	80	50	95	100	38	4	None.
105	Atter very cobbly sandy loam, 0 to 5 percent slopes	80	45	95	100	34	4	None.
106	Atter very bouldery loamy fine sand, 5 to 30 percent slopes	70	20	70	100	10	5	None.
107	Avis-Oosen complex, 5 to 30 percent slopes	---	---	---	---	17*	5	---
	Avis part	80	30	50	95	---	---	Nutrient level.
	Oosen part	95	60	50	90	---	---	Nutrient level.
108	Avis-Oosen complex, 30 to 50 percent slopes	---	---	---	---	10*	5	---
	Avis part	80	30	30	95	---	---	Nutrient level.
	Oosen part	95	70	30	90	---	---	Nutrient level.
109	Avis-Lava flows complex, 5 to 30 percent slopes	---	---	---	---	8	6	---
	Avis part	80	20	50	95	---	---	Nutrient level.
	Lava flows part	---	---	---	---	---	---	---
110	Bogus stony loam, 15 to 50 percent slopes	80	50	30	95	11	5	Nutrient level.
111	Bogus very stony loam, 15 to 50 percent slopes	80	30	30	95	7	6	Nutrient level.
112	Bonnet loam, 0 to 2 percent slopes	80	95	100	100	76	2	None.
113	Bonnet gravelly loam, 0 to 2 percent slopes	80	60	100	100	48	3	None.
114	Bonnet gravelly loam, 2 to 5 percent slopes	80	60	95	100	46	3	None.
115	Boomer loam, cool, 5 to 30 percent slopes	70	90	65	95	39	4	Nutrient level.
116	Boomer, cool-Neuns complex, 30 to 70 percent slopes	---	---	---	---	13*	5	---
	Boomer, cool part	70	90	25	95	---	---	Nutrient level.
	Neuns part	70	60	25	95	---	---	Nutrient level.
117	Boomer Variant sandy loam, 30 to 50 percent slopes	90	95	30	90	23	4	Nutrient level.
118	Boomer Variant stony sandy loam, 5 to 30 percent slopes	90	70	50	90	28	4	Nutrient level.

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
119	Chaix-Chawanakee gravelly coarse sandy loams, 5 to 30 percent slopes	---	---	---	---	14*	5	Acidity.
	Chaix part	70	50	50	95	---	---	Nutrient level.
	Chawanakee part	40	50	50	95	---	---	Nutrient level.
120	Chaix-Chawanakee gravelly coarse sandy loams, 30 to 50 percent slopes	---	---	---	---	8*	6	---
	Chaix part	70	45	30	95	---	---	Nutrient level.
	Chawanakee part	40	45	30	95	---	---	Nutrient level.
121	Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes	---	---	---	---	5*	6	---
	Chaix part	70	45	20	95	---	---	Nutrient level.
	Chawanakee part	40	45	20	95	---	---	Nutrient level.
122	Copsey clay, 0 to 9 percent slopes	95	45	95	60x90	22	4	Drainage, nutrient level.
123	Copsey gravelly clay, 2 to 9 percent slopes	95	45	95	60x90	22	4	Drainage, nutrient level.
124	Copsey cobbly clay, 2 to 9 percent slopes	95	40	95	60x90	19	5	Drainage, nutrient level.
125	Deetz gravelly loamy sand, 0 to 5 percent slopes	90	40	95	90	31	4	Nutrient level.
126	Deetz gravelly loamy sand, 5 to 15	90	40	85	90	27	4	Nutrient level.
127	Deetz stony loamy sand, 2 to 15 percent slopes	90	30	90	90	22	4	Nutrient level.
128	Deetz stony loamy sand, 15 to 30 percent slopes	90	30	65	90	16	5	Nutrient level.
129	Delaney sand, 0 to 9 percent slopes	90	60	95	90	46	3	Nutrient level.
130	Delaney gravelly sand, 0 to 9 percent slopes	90	40	95	90	31	4	Nutrient level.
131	Delaney stony sand, 0 to 15 percent slopes	90	30	90	90	22	4	Nutrient level.
132	Delaney sandy loam, 0 to 2 percent slopes	90	95	100	90	77	2	Nutrient level.
133	Delaney sandy loam, 2 to 5 percent slopes	90	95	75	90	73	2	Nutrient level.
134	Delaney Variant silt, 0 to 2 percent slopes	95	100	100	75x95	68	2	Flooding, nutrient level.
135	Deven-Rubble land complex, 0 to 30 percent slopes	---	---	---	---	14	5	---
	Deven part	40	55	65	100	---	---	None.
	Rubble land	---	---	---	---	---	---	---
136	Diyou loam	95	100	100	80x60	46	3	Flooding, water table.
137	Diyou loam, drained	95	100	100	95x80	72	2	Flooding, water table.
138	Diyou loam, peat substratum	95	100	100	95x60	54	3	Flooding, water table.

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
139	Dotta loam, 0 to 2 percent slopes	85	100	100	100	85	1	None.
140	Dotta loam, 2 to 9 percent slopes	85	100	95	100	81	1	None.
141	Dotta gravelly loam, 0 to 2 percent slopes	85	70	100	100	59	3	None.
142	Dotta gravelly loam, 2 to 5 percent slopes	85	70	95	100	56	3	None.
143	Dubakella-Ipish complex, 5 to 30 percent slopes	---	---	---	---	21*	4	---
	Dubakella part	60	70	50	85	---	---	Nutrient level.
	Ipish part	80	70	50	85	---	---	Nutrient level.
144	Dubakella-Ipish complex, 30 to 50 percent slopes	---	---	---	---	12*	5	---
	Dubakella part	60	70	30	85	---	---	Nutrient level.
	Ipish part	80	70	30	85	---	---	Nutrient level.
145	Dumps	---	---	---	---	<10	6	---
146	Duzel gravelly loam, 5 to 9 percent slopes	70	70	90	95	42	3	Nutrient level.
147	Duzel gravelly loam, 9 to 15 percent slopes	70	70	80	95	37	4	Nutrient level.
148	Duzel-Jilson-Facey complex, 15 to 50 percent slopes	---	---	---	---	13*	5	---
	Duzel part	70	65	30	95	---	---	Nutrient level.
	Jilson part	35	65	30	95	---	---	Nutrient level.
	Facey part	90	95	30	95	---	---	Nutrient level.
149	Esro silt loam	100	100	100	50x20	10	5	Flooding, water table.
150	Esro silt loam, drained	100	100	100	90x60	54	3	Flooding, water table.
151	Etsel very gravelly loam, 30 to 75 percent slopes	20	60	20	95	2	6	Nutrient level.
152	Facey loam, 5 to 15 percent slopes	85	100	85	100	72	2	None.
153	Gazelle silt loam	20	80	100	80x70 x80	13	5	Salts and sodium, flooding, water table.
154	Gazelle Variant sandy clay loam	20	80	100	80x90 x80	9	6	Salts and sodium, flooding, water table.
155	Hilt sandy loam, 2 to 15 percent slopes	75	90	85	100	57	3	None.
156	Hilt sandy loam, 15 to 30 percent slopes	75	90	50	100	34	4	None.
157	Hilt stony sandy loam, 2 to 50 percent slopes	75	60	30	100	13	5	None.
158	Hilt-Rock outcrop complex, 2 to 50 percent slopes	---	---	---	---	6	6	---
	Hilt part	75	25	30	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	---
159	Jenny clay, 0 to 2 percent slopes	100	60	100	100	60	2	None.
160	Jenny clay, 2 to 15 percent slopes	100	60	85	100	51	3	None.

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
161	Jenny cobbly clay, 0 to 15 percent slopes	100	40	85	100	34	4	None.
162	Jilson gravelly loam, 50 to 65 percent slopes	40	70	25	100	7	6	None.
163	Jilson-Duzel gravelly loams, 5 to 50 percent slopes	---	---	---	---	10*	5	---
	Jilson part	40	50	40	100	---	---	None.
	Duzel part	70	50	40	95	---	---	Nutrient level.
164	Kindig-Neuns gravelly loams, 15 to 50 percent slopes	---	---	---	---	15*	5	---
	Kindig part	80	55	40	95	---	---	Nutrient level.
	Neuns part	60	55	40	95	---	---	Nutrient level.
165	Kindig-Neuns gravelly loams, 50 to 80 percent slopes	---	---	---	---	10*	5	---
	Kindig part	80	70	20	95	---	---	Nutrient level.
	Neuns part	60	70	20	95	---	---	Nutrient level.
166	Kinkel very gravelly loam, 2 to 15 percent slopes	80	60	85	90	37	4	Nutrient level.
167	Kuck clay loam, 2 to 9 percent slopes	50	85	90	100	38	4	None.
168	Kuck clay loam, 9 to 15 percent slopes	50	85	85	100	36	4	None.
169	Lassen clay, 2 to 9 percent slopes	50	60	90	100	27	4	None.
170	Lassen clay, 9 to 15 percent slopes	50	60	85	100	25	4	None.
171	Lassen cobbly clay, 2 to 15 percent slopes	50	40	85	100	17	5	None.
172	Lassen-Kuck complex, 15 to 50 percent slopes	---	---	---	---	11*	5	
	Lassen part	50	50	40	100	---	---	None.
	Kuck part	50	75	40	100	---	---	None.
173	Lassen-Kuck complex, stony, 2 to 50 percent slopes	---	---	---	---	10*	5	---
	Lassen part	50	40	40	100	---	---	None.
	Kuck part	50	65	40	100	---	---	None.
174	Lassen-Rock outcrop-Kuck complex, 2 to 50 percent slopes	---	---	---	---	7*	6	---
	Lassen part	50	20	40	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	---
	Kuck part	50	65	40	100	---	---	None.
175	Lava flows	---	---	---	---	<10	6	---
176	Lava flows-Xerorthents complex, 0 to 50 percent slopes	---	---	---	---	<10	6	---
177	Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes	---	---	---	---	7	6	---
	Lithic Haploxerolls part	25	70	40	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	---
178	Lithic Xerorthents-Rock outcrop complex, 0 to 65 percent slopes	---	---	---	---	7	6	---
	Lithic Xerorthents part	25	70	40	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	Rating factors B	Rating factors C	Rating factors X	Index	Grade	Limitation in X factor
179	Louie loam, 0 to 2 percent slopes	35	100	100	100	35	4	None.
180	Louie loam, 2 to 9 percent	35	100	90	100	31	4	None.
181	Louie stony loam, 0 to 9 percent slopes	35	70	90	100	22	4	None.
182	Louie Variant sandy clay loam, 2 to 9 percent slopes	40	80	90	100	29	4	None.
183	Marpa-Kinkel-Boomer, cool complex, 5 to 15 percent slopes	---	---	---	---	29*	4	---
	Marpa part	50	60	85	95	---	---	Nutrient level.
	Kinkel part	80	50	85	95	---	---	Nutrient level.
	Boomer, cool part	70	60	85	95	---	---	Nutrient level.
184	Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes	---	---	---	---	13*	5	---
	Marpa part	50	55	40	95	---	---	Nutrient level.
	Kinkel part	80	45	40	95	---	---	Nutrient level.
	Boomer, cool part	70	55	40	95	---	---	Nutrient level.
185	Mary loam, 2 to 9 percent slopes	55	100	90	100	49	3	None.
186	Mary loam, 9 to 15 percent slopes	55	95	85	100	44	3	None.
187	Mary stony loam, 2 to 50 percent slopes	55	70	40	100	15	5	None.
188	Mary-Rock outcrop complex, 2 to 50 percent slopes	---	---	---	---	12	5	---
	Mary part	55	55	40	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	---
189	Medford clay loam, cool, 0 to 2 percent slopes	75	85	100	95	61	2	Nutrient level.
190	Medford clay loam, cool, 2 to 5 percent slopes	75	85	95	95	57	3	Nutrient level.
191	Medford clay loam, cool, 5 to 15 percent slopes	75	85	85	95	51	3	Nutrient level.
192	Montague clay, 0 to 2 percent slopes	30	60	100	100	18	5	None.
193	Montague clay, 2 to 9 percent slopes	30	60	90	100	16	5	None.
194	Montague cobbly clay, 0 to 9 percent slopes	30	40	90	100	11	5	None.
195	Montague Variant clay, 0 to 9 percent slopes	20	60	90	100	11	5	None.
196	Neer-Ponto stony sandy loams, 15 to 50 percent slopes	---	---	---	---	12*	5	---
	Neer part	50	50	40	90	---	---	Nutrient level.
	Ponto part	90	50	40	90	---	---	Nutrient level.
197	Neer-Ponto complex, 15 to 50 percent slopes	---	---	---	---	20*	4	---
	Neer part	50	70	40	90	---	---	Nutrient level.
	Ponto part	90	95	40	90	---	---	Nutrient level.
198	Odas sandy loam	100	95	100	40x90 x90	31	4	Water table, flooding, nutrient level.

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
199	Oosen loamy sand, 2 to 15 percent slopes	95	75	80	90	51	3	Nutrient level.
200	Orset sandy loam, 0 to 9 percent slopes	95	95	85	95	73	2	Nutrient level.
201	Pinehurst stony loam, 2 to 15 percent slopes	70	70	80	90	35	4	Nutrient level.
202	Pinehurst stony loam, 15 to 30 percent slopes	70	70	50	90	22	4	Nutrient level.
203	Pinehurst stony loam, 30 to 50 percent slopes	70	70	30	90	13	5	Nutrient level.
204	Pinehurst Variant very stony loam, 0 to 15 percent slopes	40	40	80	95	12	5	Nutrient level.
205	Pinehurst Variant very stony loam, 15 to 65 percent slopes	40	45	30	95	5	6	Nutrient level.
206	Pit clay	100	60	100	70x60	25	4	Flooding, water table.
207	Plutos-Rock outcrop complex, 0 to 30 percent slopes	---	---	---	---	10	5	---
	Plutos part	50	45	50	90	---	---	Nutrient level.
	Rock outcrop part	---	---	---	---	---	---	---
208	Ponto sandy loam, 5 to 15 percent slopes	90	95	80	90	62	2	Nutrient level.
209	Ponto-Neer complex, 2 to 15 percent slopes	---	---	---	---	46*	3	---
	Ponto part	90	95	80	90	---	---	Nutrient level.
	Neer part	50	70	80	90	---	---	Nutrient level.
210	Redola loam, 0 to 2 percent slopes	80	100	100	90	72	2	Sodic subsurface.
211	Redola loam, 2 to 9 percent slopes	80	100	90	90	65	2	Sodic subsurface.
212	Riverwash	---	---	---	---	<10	6	---
213	Rock outcrop-Dubakella complex, 30 to 50 percent slopes	---	---	---	---	3	6	---
	Rock outcrop part	---	---	---	---	---	---	---
	Dubakella part	60	20	30	85	---	---	Nutrient level.
214	Rock outcrop-Louie complex, 0 to 15 percent slopes	---	---	---	---	6	6	---
	Rock outcrop part	---	---	---	---	---	---	---
	Louie part	30	25	80	100	---	---	None.
215	Rock outcrop-Terwilliger complex, 2 to 50 percent slopes	---	---	---	---	5	6	---
	Rock outcrop part	---	---	---	---	---	---	---
	Terwilliger part	60	20	40	95	---	---	Nutrient level.
216	Rock outcrop	---	---	---	---	<10	6	---
217	Salisbury clay loam, 0 to 2 percent slopes	30	85	100	100	25	4	None.
218	Salisbury clay loam, 2 to 9 percent slopes	30	85	90	100	23	4	None.

See footnote at end of table.

TABLE 6.--STORIE INDEX RATING--Continued

Map symbol	Map unit	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
219	Salisbury gravelly clay loam, 0 to 5 percent slopes	30	70	95	100	20	4	None.
220	Salisbury gravelly clay loam, 5 to 9 percent slopes	30	70	90	100	19	5	None.
221	Salisbury cobbly loam, 0 to 9 percent slopes	30	60	90	100	16	5	None.
222	Settlemeyer loam, 0 to 2 percent slopes	100	100	100	70x30	21	4	Flooding, water table.
223	Settlemeyer loam, drained, 2 to 5 percent slopes	100	100	95	90x50	43	3	Flooding, water table.
224	Settlemeyer Variant silt loam	80	100	100	50	40	3	Water table.
225	Sheld very stony sandy loam, 50 to 65 percent slopes	65	50	25	90	7	6	Nutrient level.
226	Sheld-Iller stony sandy loams, 9 to 30 percent slopes	---	---	---	---	18*	5	---
	Sheld part	65	50	50	90	---	---	Nutrient level.
	Iller part	80	70	50	85	---	---	Nutrient level.
227	Sheld-Iller stony sandy loams, 30 to 50 percent slopes	---	---	---	---	10*	5	---
	Sheld part	65	50	30	90	---	---	Nutrient level.
	Iller part	80	70	30	85	---	---	Nutrient level.
228	Snell very stony loam, 5 to 30 percent slopes	35	50	50	95	8	6	Nutrient level.
229	Stoner gravelly sandy loam, 0 to 2 percent slopes	90	70	100	95	60	2	Nutrient level.
230	Stoner gravelly sandy loam, 2 to 5 percent slopes	90	70	95	95	57	3	Nutrient level.
231	Stoner gravelly sandy loam, 5 to 15 percent slopes	90	70	80	95	48	3	Nutrient level.
232	Terwilliger silty clay loam, 2 to 9 percent slopes	60	90	90	95	46	3	Nutrient level.
233	Terwilliger silty clay loam, 9 to 15 percent slopes	65	90	80	95	41	3	Nutrient level.
234	Terwilliger silty clay loam, 15 to 50 percent slopes	60	90	40	95	20	4	Nutrient level.
235	Terwilliger stony silty clay loam, 2 to 50 percent slopes	60	60	40	95	14	5	Nutrient level.
236	Uhlig Variant stony loam, 5 to 50 percent slopes	75	60	40	95	17	5	Nutrient level.
237	Weitchpec Variant-Rock outcrop complex, 5 to 65 percent slopes	---	---	---	---	7	5	---
	Weitchpec Variant part	40	70	30	85	---	---	Nutrient level.
	Rock outcrop part	---	---	---	---	---	---	
238	Xerofluvents, nearly level	80	50	100	50x60 x75	9	6	Flooding, channels, deposition.

* Weighted average of major components.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
112: Bonnet	Loamy	Favorable	1,200	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	600	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
113, 114: Bonnet	Gravelly Loam	Favorable	800	Beardless wheatgrass	20
		Normal	600	Bottlebrush squirreltail	20
		Unfavorable	400	Western juniper	20
				Idaho fescue	10
				Bluebunch wheatgrass	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
122, 123: Copsey	Wet Meadow	Favorable	5,000	Carex	25
		Normal	4,000	Redtop	15
		Unfavorable	3,000	Rush	10
				Kentucky bluegrass	10
				Tufted hairgrass	5
				Timothy	5
				Oniongrass	5
				Meadow fescue	5
				Clover	5
124: Copsey	Wet Meadow	Favorable	4,500	Carex	25
		Normal	3,000	Redtop	15
		Unfavorable	2,500	Rush	10
				Bluegrass	10
				Tufted hairgrass	5
				Timothy	5
				Oniongrass	5
				Meadow fescue	5
				Clover	5
129: Delaney	Sandy	Favorable	1,400	Western juniper	20
		Normal	800	Manzanita	20
		Unfavorable	400	Antelope bitterbrush	20
				Big sagebrush	10
				Ponderosa pine	10
130: Delaney	Sandy	Favorable	1,400	Western juniper	20
		Normal	800	Manzanita	20
		Unfavorable	400	Antelope bitterbrush	20
				Ponderosa pine	10
				Big sagebrush	10
131: Delaney	Stony Sands	Favorable	1,200	Western juniper	30
		Normal	800	Manzanita	25
		Unfavorable	600	Big sagebrush	10
				Rabbitbrush	10

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
132, 133 Delaney	Coarse Loamy	Favorable	1,600	Bottlebrush squirreltail	20
		Normal	1,000	Thurber needlegrass	15
		Unfavorable	700	Redstem filaree	15
				Rubber rabbitbrush	10
				Idaho fescue	5
				Bulbous oniongrass	5
				Bulbous bluegrass	5
				Western juniper	5
				Big sagebrush	5
				Manzanita	5
				Antelope bitterbrush	5
134 Delaney Variant	Loamy	Favorable	1,200	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	600	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
135*:					
Deven	Shallow Loamy	Favorable	750	Bluebunch wheatgrass	15
		Normal	600	Nevada bluegrass	15
		Unfavorable	450	Western juniper	15
				Thurber needlegrass	10
				Danthonia	10
				Bottlebrush squirreltail	5
				Lupine	5
				Buckwheat	5
				Low phlox	5
				Antelope bitterbrush	5
				Low sagebrush	5
				Curlleaf mountainmahogany	5
Rubble land.					
136 Diyou	Wet Meadow	Favorable	5,000	Carex	25
		Normal	4,000	Redtop	15
		Unfavorable	3,000	Rush	10
				Bluegrass	10
				Tufted hairgrass	5
				Timothy	5
				Melic	5
				Meadow fescue	5
				Clover	5
137 Diyou	Wet Meadow	Favorable	6,000	Carex	25
		Normal	5,000	Rush	25
		Unfavorable	4,000	Tufted hairgrass	10
				Redtop	5
				Timothy	5
				Melic	5
				Bluegrass	5
				Meadow fescue	5
				Clover	5
138 Diyou	Wet Meadow	Favorable	4,000	Carex	20
		Normal	3,000	Rush	10
		Unfavorable	2,500	Tufted hairgrass	10
				Bluegrass	10
				Redtop	5
				Timothy	5
				Melic	5
				Meadow fescue	5
				Clover	5
				California oatgrass	5
				Northern mannagrass	5
				Bluejoint reedgrass	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
139, 140 Dotta	Loamy	Favorable	1,400	Bluebunch wheatgrass	25
		Normal	1,000	Idaho fescue	20
		Unfavorable	800	Beardless wheatgrass	10
				Buckbrush	10
				Big sagebrush	10
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Antelope bitterbrush	5
141, 142 Dotta	Gravelly Loam	Favorable	1,200	Beardless wheatgrass	20
		Normal	1,000	Bottlebrush squirreltail	20
		Unfavorable	800	Western juniper	15
				Bluebunch wheatgrass	10
				Idaho fescue	10
				Big sagebrush	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
146, 147 Duzel	Gravelly Loam	Favorable	1,400	Beardless wheatgrass	20
		Normal	900	Bottlebrush squirreltail	20
		Unfavorable	600	Western juniper	20
				Bluebunch wheatgrass	10
				Idaho fescue	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
148*:					
Duzel	Gravelly Loam	Favorable	1,400	Beardless wheatgrass	20
		Normal	900	Bottlebrush squirreltail	20
		Unfavorable	600	Western juniper	20
				Bluebunch wheatgrass	10
				Idaho fescue	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
Jilson	Shallow Gravelly Loam	Favorable	800	Bottlebrush squirreltail	20
		Normal	600	Cheatgrass	15
		Unfavorable	400	Bulbous bluegrass	10
				Thurber needlegrass	10
				Redstem filaree	10
				Hog fennel	5
				Western juniper	5
				Rabbitbrush	5
				Bluebunch wheatgrass	5
				Idaho fescue	5
				Sandberg bluegrass	5
Facey	Loamy	Favorable	1,400	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
149 Esro	Wet Meadow	Favorable	2,000	Tufted hairgrass	40
		Normal	1,500	Northern mannagrass	20
		Unfavorable	1,000	Clover	5
				California oatgrass	5
				Bluejoint reedgrass	5
				Willow	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
150 Esro	Wet Meadow	Favorable	2,200	Tufted hairgrass	40
		Normal	1,600	Northern mannagrass	20
		Unfavorable	1,200	Clover	10
				California oatgrass	10
				Bluejoint reedgrass	5
				Willow	5
151 Etsel	Shallow Stony Loam	Favorable	2,400	Ceanothus	20
		Normal	1,800	Manzanita	20
		Unfavorable	1,400	Lemmon ceanothus	15
				Sierra chinquapin	10
				Mountain brome	5
				California scrub oak	5
				California black oak	5
152 Facey	Loamy	Favorable	1,400	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	800	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
153 Gazelle	Saline Meadow	Favorable	1,800	Carex	40
		Normal	1,400	Rush	20
		Unfavorable	1,000	Bluegrass	10
				Inland saltgrass	5
				Alkali bluegrass	5
				Basin wildrye	5
				Alkali sacaton	5
154 Gazelle Variant	Saline Meadow	Favorable	1,800	Carex	40
		Normal	1,400	Rush	20
		Unfavorable	1,000	Bluegrass	10
				Inland saltgrass	5
				Alkali bluegrass	5
				Basin wildrye	5
				Alkali sacaton	5
155, 156 Hilt	Coarse Loamy	Favorable	1,800	Bottlebrush squirreltail	20
		Normal	1,500	Thurber needlegrass	15
		Unfavorable	800	Redstem filaree	15
				Rubber rabbitbrush	10
				Idaho fescue	5
				Bulbous oniongrass	5
				Bulbous bluegrass	5
				Cheatgrass	5
				Western juniper	5
				Big sagebrush	5
157 Hilt	Stony Coarse Loamy	Favorable	1,000	Idaho fescue	15
		Normal	600	Beardless wheatgrass	15
		Unfavorable	300	Bottlebrush squirreltail	10
				Ceanothus	10
				Bluebunch wheatgrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Cheatgrass	5
				Oregon white oak	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
158*:					
Hilt	Coarse Loamy	Favorable	1,000	Idaho fescue	15
		Normal	600	Beardless wheatgrass	15
		Unfavorable	300	Bottlebrush squirreltail	10
				Ceanothus	10
				Bluebunch wheatgrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Cheatgrass	5
				Oregon white oak	5
Rock outcrop.					
159, 160 Jenny	Clayey	Favorable	1,400	Bluebunch wheatgrass	10
		Normal	800	Beardless wheatgrass	10
		Unfavorable	400	Idaho fescue	10
				Sheep fescue	10
				Sulphurflower	10
				Bulbous bluegrass	5
				Sandberg bluegrass	5
				Foxtail fescue	5
				Bottlebrush squirreltail	5
				Hog fennel	5
				Lupine	5
				California black oak	5
				Poison-oak	5
				Western juniper	5
161 Jenny	Cobbly Clay	Favorable	700	Bottlebrush squirreltail	15
		Normal	500	Western juniper	15
		Unfavorable	300	Bluebunch wheatgrass	10
				Idaho fescue	10
				Beardless wheatgrass	5
				Thurber needlegrass	5
				Sandberg bluegrass	5
				Bulbous bluegrass	5
				Buckwheat	5
				Hog fennel	5
				Western yarrow	5
				California black oak	5
162 Jilson	Shallow Gravelly Loam	Favorable	800	Bottlebrush squirreltail	20
		Normal	600	Cheatgrass	15
		Unfavorable	400	Bulbous bluegrass	10
				Thurber needlegrass	10
				Redstem filaree	10
				Hog fennel	5
				Western juniper	5
				Rabbitbrush	5
				Bluebunch wheatgrass	5
				Idaho fescue	5
				Sandberg bluegrass	5
163*:					
Jilson	Shallow Gravelly Loam	Favorable	800	Bottlebrush squirreltail	20
		Normal	600	Cheatgrass	15
		Unfavorable	400	Bulbous bluegrass	10
				Thurber needlegrass	10
				Redstem filaree	10
				Hog fennel	5
				Western juniper	5
				Rabbitbrush	5
				Bluebunch wheatgrass	5
				Idaho fescue	5
				Sandberg bluegrass	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
163*:					
Duzel	Gravelly Loam	Favorable	1,400	Beardless wheatgrass	20
		Normal	900	Bottlebrush squirreltail	20
		Unfavorable	600	Western juniper	20
				Bluebunch wheatgrass	10
				Idaho fescue	10
				Thurber needlegrass	5
				Antelope bitterbrush	5
				Buckbrush	5
167, 168 Kuck	Clayey	Favorable	1,200	Bluebunch wheatgrass	10
		Normal	900	Beardless wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Bottlebrush squirreltail	10
				Western juniper	10
				Sheep fescue	5
				Sandberg bluegrass	5
				Sulphurflower	5
				Lupine	5
				California black oak	5
169, 170 Lassen	Clayey	Favorable	1,200	Bluebunch wheatgrass	10
		Normal	900	Beardless wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Bottlebrush squirreltail	10
				Western juniper	10
				Sheep fescue	5
				Sandberg bluegrass	5
				Sulphurflower	5
				Lupine	5
				California black oak	5
				Poison-oak	5
171 Lassen	Cobbly Clay	Favorable	1,100	Beardless wheatgrass	20
		Normal	700	California black oak	10
		Unfavorable	500	Western juniper	10
				Idaho fescue	10
				Bluebunch wheatgrass	10
				Thurber needlegrass	10
				Sulphurflower	5
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Lupine	5
172*:					
Lassen	Clayey	Favorable	1,200	Bluebunch wheatgrass	10
		Normal	900	Beardless wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Bottlebrush squirreltail	10
				Western juniper	10
				Sheep fescue	5
				Sandberg bluegrass	5
				Sulphurflower	5
				Lupine	5
				California black oak	5
				Poison-oak	5
Kuck	Clayey	Favorable	1,200	Bluebunch wheatgrass	10
		Normal	900	Beardless wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Bottlebrush squirreltail	10
				Western juniper	10
				Sheep fescue	5
				Sandberg bluegrass	5
				Sulphurflower	5
				Lupine	5
				California black oak	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
173*:					
Lassen	Stony Clay	Favorable	1,100	Beardless wheatgrass	20
		Normal	700	California black oak	10
		Unfavorable	500	Western juniper	10
				Idaho fescue	10
				Bluebunch wheatgrass	10
				Thurber needlegrass	10
				Sulphurflower	5
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Lupine	5
Kuck	Stony Clay	Favorable	1,100	Beardless wheatgrass	20
		Normal	700	Bluebunch wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Thurber needlegrass	10
				Western juniper	10
				California black oak	10
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Lupine	5
				Sulphurflower	5
174*:					
Lassen	Stony Clay	Favorable	1,100	Beardless wheatgrass	20
		Normal	700	California black oak	10
		Unfavorable	500	Western juniper	10
				Idaho fescue	10
				Bluebunch wheatgrass	10
				Thurber needlegrass	10
				Sulphurflower	5
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Lupine	5
Rock outcrop.					
Kuck	Stony Clay	Favorable	1,100	Beardless wheatgrass	20
		Normal	700	Bluebunch wheatgrass	10
		Unfavorable	500	Idaho fescue	10
				Thurber needlegrass	10
				Western juniper	10
				California black oak	10
				Bottlebrush squirreltail	5
				Sandberg bluegrass	5
				Lupine	5
				Sulphurflower	5
179, 180 Louie	Loamy	Favorable	1,200	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	600	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
181 Louie	Stony Loam	Favorable	1,000	Bottlebrush squirreltail	25
		Normal	700	Bluebunch wheatgrass	15
		Unfavorable	500	Idaho fescue	10
				Western juniper	10
				Beardless wheatgrass	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				California black oak	5
				Buckbrush	5
				Lupine	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
182 Louie Variant	Fine Loamy	Favorable	1,600	Bottlebrush squirreltail	20
		Normal	1,000	Thurber needlegrass	15
		Unfavorable	700	Redstem filaree	15
				Rubber rabbitbrush	10
				Idaho fescue	5
				Bulbous oniongrass	5
				Bulbous bluegrass	5
				Cheatgrass	5
				Western juniper	5
				Big sagebrush	5
185, 186 Mary	Loamy	Favorable	1,200	Idaho fescue	20
		Normal	1,000	Bluebunch wheatgrass	20
		Unfavorable	600	Beardless wheatgrass	15
				Sandberg bluegrass	10
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
187 Mary	Stony Loam	Favorable	1,000	Idaho fescue	15
		Normal	600	Bottlebrush squirreltail	15
		Unfavorable	400	Bluebunch wheatgrass	10
				Redstem filaree	10
				Buckbrush	10
				Beardless wheatgrass	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
				Buckbrush	5
				Foxtail fescue	5
				Hog fennel	5
188*:					
Mary	Stony Loam	Favorable	1,000	Idaho fescue	15
		Normal	600	Bottlebrush squirreltail	15
		Unfavorable	400	Bluebunch wheatgrass	10
				Redstem filaree	10
				Buckbrush	10
				Beardless wheatgrass	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
				Buckbrush	5
				Foxtail fescue	5
				Hog fennel	5
Rock outcrop.					
189, 190, 191 Medford	Fine Loamy	Favorable	1,200	Western juniper	30
		Normal	600	Bottlebrush squirreltail	25
		Unfavorable	400	Bulbous bluegrass	15
				Thurber needlegrass	10
				Cheatgrass	5
				Redstem filaree	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
192, 193 Montague	Clayey	Favorable	1,000	Bluebunch wheatgrass	10
		Normal	800	Beardless wheatgrass	10
		Unfavorable	400	Idaho fescue	10
				Sheep fescue	10
				Sulphurflower	10
				Bulbous bluegrass	5
				Sandberg bluegrass	5
				Foxtail fescue	5
				Bottlebrush squirreltail	5
				Hog fennel	5
				Lupine	5
				California black oak	5
				Poison-oak	5
				Western juniper	5
194 Montague	Cobbly Clay	Favorable	700	Bottlebrush squirreltail	15
		Normal	500	Western juniper	15
		Unfavorable	300	Bluebunch wheatgrass	10
				Idaho fescue	10
				Beardless wheatgrass	5
				Thurber needlegrass	5
				Sandberg bluegrass	5
				Bulbous bluegrass	5
				Buckwheat	5
				Hog fennel	5
				Western yarrow	5
				Poison-oak	5
				California black oak	5
195 Montague Variant	Clayey	Favorable	600	Redstem filaree	30
		Normal	400	Bottlebrush squirreltail	20
		Unfavorable	200	Bulbous bluegrass	5
				Bulbous oniongrass	5
				Bluebunch wheatgrass	5
				Big sagebrush	5
				Rabbitbrush	5
198 Odas	Wet Meadow	Favorable	5,000	Carex	25
		Normal	4,000	Redtop	15
		Unfavorable	3,000	Rush	10
				Bluegrass	10
				Tufted hairgrass	5
				Timothy	5
				Melic	5
				Meadow fescue	5
				Clover	5
206 Pit	Wet Meadow	Favorable	---	Carex	20
		Normal	---	Tufted hairgrass	15
		Unfavorable	---	Alpine timothy	15
				Bluegrass	10
				Ligusticum	10
				Common cowparsnip	10
				Baltic rush	10
				Willow	5
				Silver sagebrush	5
207*:					
Plutos	Very Rocky Sands	Favorable	1,400	Western juniper	20
		Normal	800	Antelope bitterbrush	20
		Unfavorable	400	Manzanita	20
				Big sagebrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
Rock outcrop.					

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
210, 211----------- Redola	Coarse Loamy-------------------	Favorable	1,600	Bottlebrush squirreltail------	20
		Normal	1,000	Thurber needlegrass-----------	15
		Unfavorable	700	Filaree-----------------------	15
				Rubber rabbitbrush------------	10
				Idaho fescue------------------	5
				Bulbous oniongrass------------	5
				Bulbous bluegrass-------------	5
				Cheatgrass--------------------	5
				Common juniper----------------	5
				Big sagebrush-----------------	5
214*: Rock outcrop.					
Louie-------------	Stony Loam---------------------	Favorable	1,000	Bottlebrush squirreltail------	25
		Normal	700	Bluebunch wheatgrass----------	15
		Unfavorable	500	Idaho fescue------------------	10
				Western juniper---------------	10
				Beardless wheatgrass----------	5
				Junegrass---------------------	5
				Sandberg bluegrass------------	5
				Thurber needlegrass-----------	5
				California black oak----------	5
				Buckbrush---------------------	5
				Lupine------------------------	5
215*: Rock outcrop.					
Terwilliger-------	Stony Loam---------------------	Favorable	600	Western juniper---------------	30
		Normal	400	Idaho fescue------------------	10
		Unfavorable	200	Oregon white oak--------------	10
				Rabbitbrush-------------------	10
				Big sagebrush-----------------	10
				Bottlebrush squirreltail------	5
				Bluebunch wheatgrass----------	5
				Western chokecherry-----------	5
				Redstem filaree---------------	5
				Manzanita---------------------	5
217, 218----------- Salisbury	Fine Loamy---------------------	Favorable	1,200	Bottlebrush squirreltail------	20
		Normal	600	Bulbous bluegrass-------------	15
		Unfavorable	400	Western juniper---------------	15
				Thurber needlegrass-----------	10
				Idaho fescue------------------	10
				Cheatgrass--------------------	5
				Redstem filaree---------------	5
				Bluebunch wheatgrass----------	5
				Sandberg bluegrass------------	5
				Sagebrush---------------------	5
219, 220----------- Salisbury	Gravelly Fine Loamy------------	Favorable	900	Thurber needlegrass-----------	15
		Normal	700	Western juniper---------------	15
		Unfavorable	300	Bottlebrush squirreltail------	10
				Gray rabbitbrush--------------	10
				Bulbous bluegrass-------------	5
				Bulbous oniongrass------------	5
				Bluebunch wheatgrass----------	5
				Pepperweed--------------------	5
				Redstem filaree---------------	5
				Green rabbitbrush-------------	5
				Sagebrush---------------------	5
				Idaho fescue------------------	5
				Sandberg bluegrass------------	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
221 Salisbury	Cobbly Loam	Favorable	800	Bottlebrush squirreltail	20
		Normal	500	Thurber needlegrass	10
		Unfavorable	300	Idaho fescue	10
				Bulbous bluegrass	5
				Cheatgrass	5
				Western juniper	5
				Bluebunch wheatgrass	5
				Sandberg bluegrass	5
				Sagebrush	5
222 Settlemeyer	Wet Meadow	Favorable	2,800	Redtop	15
		Normal	2,500	Carex	10
		Unfavorable	2,000	Rush	10
				Bluegrass	10
				Tufted hairgrass	5
				Clover	5
				California oatgrass	5
				Willow	5
				Northern mannagrass	5
				Bluejoint reedgrass	5
				Melic	5
				Timothy	5
				Meadow fescue	5
223 Settlemeyer	Wet Meadow	Favorable	2,600	Redtop	15
		Normal	1,800	Carex	10
		Unfavorable	1,200	Rush	10
				Bluegrass	10
				Tufted hairgrass	5
				Clover	5
				California oatgrass	5
				Willow	5
				Northern mannagrass	5
				Bluejoint reedgrass	5
				Melic	5
				Timothy	5
				Meadow fescue	5
224 Settlemeyer Variant	Wet Meadow	Favorable	2,800	Carex	15
		Normal	2,200	Tufted hairgrass	15
		Unfavorable	1,800	Rush	10
				Bluegrass	10
				Redtop	5
				Timothy	5
				Melic	5
				Meadow fescue	5
				Clover	5
				California oatgrass	5
				Northern mannagrass	5
				Bluejoint reedgrass	5
228 Snell	Shallow Stony Loam	Favorable	2,500	Mountainmahogany	15
		Normal	2,000	Gooseberry	15
		Unfavorable	1,800	Western juniper	10
				Antelope bitterbrush	10
				Bluebunch wheatgrass	5
				Sandberg bluegrass	5
				Idaho fescue	5
				Buckwheat	5
				Ponderosa pine	5
				Sierra chinquapin	5
				Tanoak	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
229, 230, 231: Stoner	Gravelly Coarse Loamy	Favorable	1,200	Bottlebrush squirreltail	25
		Normal	800	Bluebunch wheatgrass	15
		Unfavorable	300	Idaho fescue	15
				Buckbrush	10
				Sandberg bluegrass	5
				Redstem filaree	5
				White oak	5
				Manzanita	5
				Rabbitbrush	5
232, 233, 234: Terwilliger	Loamy	Favorable	1,000	Idaho fescue	20
		Normal	800	Bluebunch wheatgrass	15
		Unfavorable	400	Beardless wheatgrass	15
				Buckbrush	10
				Bottlebrush squirreltail	5
				Junegrass	5
				Sandberg bluegrass	5
				Thurber needlegrass	5
				Bulbous bluegrass	5
235: Terwilliger	Stony Loam	Favorable	600	Western juniper	30
		Normal	400	Idaho fescue	10
		Unfavorable	200	Oregon white oak	10
				Rabbitbrush	10
				Big sagebrush	10
				Bottlebrush squirreltail	5
				Bluebunch wheatgrass	5
				Western chokecherry	5
				Redstem filaree	5
				Manzanita	5
236: Uhlig Variant	Stony Loam	Favorable	1,000	Bottlebrush squirreltail	25
		Normal	700	Bluebunch wheatgrass	15
		Unfavorable	500	Big sagebrush	15
				Idaho fescue	10
				Western juniper	10
				Redstem filaree	5
				Rabbitbrush	5
				Buckbrush	5
				Western chokecherry	5
				Manzanita	5
237*:					
Weitchpec Variant	Shallow Gravelly Loam	Favorable	1,400	Manzanita	40
		Normal	1,000	Western juniper	10
		Unfavorable	600	Buckbrush	10
				Redstem filaree	10
				Cheatgrass	5
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
101----------------- Asta	2o	Slight	Slight	Slight	Severe	Ponderosa pine------ Incense-cedar------- White fir----------- Douglas-fir---------	111 --- --- ---	Ponderosa pine, Douglas-fir, white fir.
102----------------- Asta	2r	Moderate	Slight	Slight	Severe	Ponderosa pine------ Incense-cedar------- White fir----------- Douglas-fir---------	111 --- --- ---	Ponderosa pine, Douglas-fir, white fir.
103----------------- Asta	2x	Moderate	Slight	Slight	Severe	Ponderosa pine------ White fir----------- Douglas-fir--------- Incense-cedar-------	111 --- --- ---	Ponderosa pine, white fir, Douglas-fir.
104----------------- Atter	4f	Slight	Severe	Slight	Moderate	Ponderosa pine------ Jeffrey pine-------- Douglas-fir--------- Incense-cedar------- White fir----------- Sugar pine----------	71 99 --- --- --- ---	Ponderosa pine, Douglas-fir.
105----------------- Atter	4f	Slight	Severe	Slight	Moderate	Ponderosa pine------ Sugar pine---------- Jeffrey pine-------- Douglas-fir--------- Incense-cedar------- White fir-----------	71 --- 99 --- --- ---	Ponderosa pine, Douglas-fir.
106----------------- Atter	4x	Severe	Severe	Slight	Moderate	Ponderosa pine------ Jeffrey pine-------- Douglas-fir--------- Incense-cedar------- White fir----------- Sugar pine----------	71 99 --- --- --- ---	Ponderosa pine, Douglas-fir.
107*:								
Avis---------------	4f	Moderate	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir--------- White fir----------- California red fir-- Incense-cedar-------	73 --- 64 46 ---	White fir, ponderosa pine, California red fir.
Oosen--------------	2o	Slight	Moderate	Slight	Severe	Ponderosa pine------ White fir----------- Douglas-fir--------- California red fir-- Incense-cedar-------	107 53 --- --- ---	White fir, California red fir.
108*:								
Avis---------------	4f	Severe	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir--------- White fir----------- California red fir-- Incense-cedar-------	73 --- 64 46 ---	White fir, ponderosa pine, California red fir.
Oosen--------------	2r	Moderate	Moderate	Slight	Severe	Ponderosa pine------ White fir----------- Douglas-fir--------- California red fir-- Incense-cedar-------	107 53 --- --- ---	White fir, California red fir.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
109*:								
Avis	4f	Moderate	Moderate	Slight	Moderate	Ponderosa pine	73	White fir, ponderosa pine, California red fir.
						Douglas-fir	---	
						White fir	64	
						California red fir	46	
						Incense-cedar	---	
Lava flows.								
110 Bogus	3x	Severe	Slight	Slight	Moderate	Ponderosa pine	90	Douglas-fir, Jeffrey pine.
						Jeffrey pine	99	
						Douglas-fir	100	
						Incense-cedar	---	
						White fir	---	
						Black oak	---	
						White oak	---	
111 Bogus	3x	Severe	Slight	Slight	Moderate	Ponderosa pine	90	Douglas-fir, Jeffrey pine.
						Jeffrey pine	99	
						Douglas-fir	100	
						Incense-cedar	---	
						White fir	---	
						Black oak	---	
						White oak	---	
115 Boomer	3r	Slight	Slight	Slight	Moderate	Ponderosa pine	90	Ponderosa pine.
						Douglas-fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
116*:								
Boomer	3r	Severe	Slight	Slight	Moderate	Ponderosa pine	90	Ponderosa pine.
						Douglas-fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
Neuns	4f	Severe	Moderate	Slight	Moderate	Douglas-fir	117	Ponderosa pine, Douglas-fir.
						Ponderosa pine	93	
						Sugar pine	---	
						Black oak	---	
117 Boomer Variant	3o	Slight	Slight	Slight	Severe	Ponderosa pine	92	Ponderosa pine, Douglas-fir.
						Douglas-fir	115	
						Sugar pine	---	
						Black oak	---	
						Oregon white oak	---	
						White fir	---	
						Incense-cedar	---	
118 Boomer Variant	3x	Slight	Slight	Slight	Severe	Ponderosa pine	92	Ponderosa pine, Douglas-fir.
						Douglas-fir	115	
						Sugar pine	---	
						Black oak	---	
						Oregon white oak	---	
						White fir	---	
119*:								
Chaix	3f	Slight	Severe	Slight	Moderate	Ponderosa pine	87	Douglas-fir, ponderosa pine.
						Douglas-fir	119	
						White fir	60	
						Sugar pine	40	
Chawanakee	4d	Slight	Severe	Moderate	Moderate	Ponderosa pine	81	Ponderosa pine, Douglas-fir.
						Douglas-fir	115	
						White fir	60	
						Sugar pine	40	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
120*:								
Chaix	3f	Moderate	Severe	Slight	Moderate	Ponderosa pine	87	Douglas-fir, ponderosa pine.
						Douglas-fir	119	
						White fir	60	
						Sugar pine	40	
Chawanakee	4d	Moderate	Severe	Moderate	Moderate	Ponderosa pine	81	Ponderosa pine, Douglas-fir.
						Douglas-fir	115	
						White fir	60	
						Sugar pine	40	
121*:								
Chaix	3f	Severe	Severe	Slight	Moderate	Ponderosa pine	87	Douglas-fir, ponderosa pine.
						Douglas-fir	119	
						White fir	60	
						Sugar pine	40	
Chawanakee	4d	Severe	Severe	Moderate	Moderate	Ponderosa pine	81	Ponderosa pine, Douglas-fir.
						Douglas-fir	115	
						White fir	60	
						Sugar pine	40	
125, 126, 127, 128-Deetz	2f	Slight	Moderate	Slight	Severe	Ponderosa pine	104	Ponderosa pine, Douglas-fir.
						White fir	---	
						Douglas-fir	---	
						Sugar pine	---	
						Incense-cedar	---	
						Black oak	---	
143*:								
Dubakella	5t	Slight	Severe	Moderate	Moderate	Digger pine	---	
						Ponderosa pine	60	
						Jeffrey pine	60	
						Incense-cedar	---	
						Douglas-fir	95	
Ipish	5t	Slight	Severe	Slight	Slight	Jeffrey pine	70	Jeffrey pine.
						Incense-cedar	---	
144*:								
Dubakella	5t	Moderate	Severe	Moderate	Moderate	Digger pine	---	
						Ponderosa pine	60	
						Jeffrey pine	60	
						Incense-cedar	---	
						Douglas-fir	95	
Ipish	5t	Moderate	Severe	Slight	Slight	Jeffrey pine	70	Jeffrey pine.
						Incense-cedar	---	
164*:								
Kindig	4r	Severe	Slight	Slight	Severe	Douglas-fir	121	Douglas-fir, ponderosa pine.
						Ponderosa pine	93	
						Sugar pine	---	
						Incense-cedar	---	
						Black oak	---	
Neuns	4f	Moderate	Moderate	Slight	Moderate	Douglas-fir	117	Ponderosa pine, Douglas-fir.
						Ponderosa pine	93	
						Sugar pine	---	
						Black oak	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
165*:								
Kindig	4r	Severe	Slight	Slight	Severe	Douglas-fir	121	Douglas-fir, ponderosa pine.
						Ponderosa pine	93	
						Sugar pine	---	
						Incense-cedar	---	
						Black oak	---	
Neuns	4f	Severe	Moderate	Slight	Moderate	Douglas-fir	117	Ponderosa pine, Douglas-fir.
						Ponderosa pine	93	
						Sugar pine	---	
						Black oak	---	
166 Kinkel	4f	Slight	Slight	Slight	Moderate	Ponderosa pine	82	Ponderosa pine, Douglas-fir.
						Douglas-fir	99	
						White fir	59	
						Incense-cedar	---	
						Sugar pine	---	
183*:								
Marpa	3f	Slight	Moderate	Slight	Moderate	Ponderosa pine	87	Ponderosa pine, Douglas-fir.
						Douglas-fir	97	
						White fir	62	
						Black oak	---	
Kinkel	4f	Slight	Slight	Slight	Moderate	Ponderosa pine	82	Ponderosa pine, Douglas-fir.
						Douglas-fir	99	
						White fir	59	
						Incense-cedar	---	
						Sugar pine	---	
Boomer	3o	Slight	Slight	Slight	Moderate	Ponderosa pine	90	Ponderosa pine.
						Douglas-fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
184*:								
Marpa	3f	Moderate	Moderate	Slight	Moderate	Ponderosa pine	87	Ponderosa pine, Douglas-fir.
						Douglas-fir	97	
						White fir	62	
						Black oak	---	
Kinkel	4f	Moderate	Slight	Slight	Moderate	Ponderosa pine	82	Ponderosa pine, Douglas-fir.
						Douglas-fir	99	
						White fir	59	
						Incense-cedar	---	
						Sugar pine	---	
Boomer	3r	Moderate	Slight	Slight	Moderate	Ponderosa pine	90	Ponderosa pine.
						Douglas-fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
196*:								
Neer	4x	Moderate	Moderate	Slight	Moderate	Ponderosa pine	82	Douglas-fir, white fir.
						Douglas-fir	---	
						White fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
Ponto	1x	Moderate	Slight	Slight	Severe	Ponderosa pine	120	Ponderosa pine, Douglas-fir.
						Douglas-fir	---	
						Incense-cedar	---	
						Black oak	---	
						Sugar pine	---	
						White fir	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
197*:								
Neer	4f	Moderate	Moderate	Slight	Moderate	Ponderosa pine	82	Douglas-fir, white fir.
						Douglas-fir	---	
						White fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
Ponto	1r	Moderate	Slight	Slight	Severe	Ponderosa pine	120	Ponderosa pine, Douglas-fir.
						Douglas-fir	---	
						Incense-cedar	---	
						Black oak	---	
						Sugar pine	---	
						White fir	---	
199 Oosen	2o	Slight	Moderate	Slight	Severe	Ponderosa pine	107	White fir, California red fir.
						White fir	53	
						Douglas-fir	---	
						California red fir	---	
						Incense-cedar	---	
200 Orset	4o	Slight	Moderate	Slight	Moderate	Ponderosa pine	81	Douglas-fir, ponderosa pine.
						Douglas-fir	---	
						White fir	---	
201 Pinehurst	4o	Slight	Slight	Slight	Severe	Douglas-fir	105	Douglas-fir, ponderosa pine, white fir.
						White fir	55	
						Sugar pine	---	
						Ponderosa pine	85	
						Incense-cedar	---	
						Black oak	---	
202 Pinehurst	4o	Slight	Slight	Slight	Severe	Douglas-fir	105	Douglas-fir, ponderosa pine, white fir.
						White fir	55	
						Sugar pine	---	
						Ponderosa pine	85	
						Incense-cedar	---	
						Black oak	---	
203 Pinehurst	4r	Moderate	Slight	Slight	Severe	Douglas-fir	105	Douglas-fir, ponderosa pine, white fir.
						White fir	55	
						Sugar pine	---	
						Ponderosa pine	85	
						Incense-cedar	---	
						Black oak	---	
204 Pinehurst Variant	5x	Moderate	Moderate	Slight	Slight	Douglas-fir	84	Douglas-fir, ponderosa pine.
						Ponderosa pine	76	
205 Pinehurst Variant	5x	Severe	Moderate	Slight	Slight	Douglas-fir	84	Douglas-fir, ponderosa pine.
						Ponderosa pine	76	
208 Ponto	1o	Slight	Slight	Slight	Severe	Ponderosa pine	120	Ponderosa pine, Douglas-fir.
						Douglas-fir	---	
						Incense-cedar	---	
						Black oak	---	
						Sugar pine	---	
						White fir	---	
209*:								
Ponto	1o	Slight	Slight	Slight	Severe	Ponderosa pine	120	Ponderosa pine, Douglas-fir.
						Douglas-fir	---	
						Incense-cedar	---	
						Black oak	---	
						Sugar pine	---	
						White fir	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Trees to plant
		Management concerns				Potential productivity		
209*:								
Neer	4f	Slight	Moderate	Slight	Moderate	Ponderosa pine	82	Douglas-fir, white fir.
						Douglas-fir	---	
						White fir	---	
						Incense-cedar	---	
						Sugar pine	---	
						Black oak	---	
225 Sheld	4x	Severe	Severe	Slight	Moderate	Ponderosa pine	75	White fir.
						Douglas-fir	---	
						Incense-cedar	---	
						White fir	64	
						California red fir	---	
226*:								
Sheld	4x	Slight	Severe	Slight	Moderate	Ponderosa pine	75	White fir.
						Douglas-fir	---	
						Incense-cedar	---	
						White fir	64	
						California red fir	---	
Iller	4x	Moderate	Moderate	Slight	Severe	White fir	60	White fir, California red fir, ponderosa pine.
						California red fir	43	
						Ponderosa pine	92	
227*:								
Sheld	4x	Moderate	Severe	Slight	Moderate	Ponderosa pine	75	White fir.
						Douglas-fir	---	
						Incense-cedar	---	
						White fir	64	
						California red fir	---	
Iller	4x	Severe	Moderate	Slight	Severe	White fir	60	White fir, California red fir, ponderosa pine.
						California red fir	43	
						Ponderosa pine	92	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
101, 102, 103: Asta	Favorable	3,200	Oak	50
	Normal	2,500	Common snowberry	15
	Unfavorable	2,000	Brackenfern	10
			Gooseberry	5
			Manzanita	5
			Rose	5
104: Atter	Favorable	600	Antelope bitterbrush	20
	Normal	400	Marlahan mustard	15
	Unfavorable	300	California brome	15
			Idaho fescue	10
			Oak	10
			Cheatgrass	10
			Sulphurflower	10
			Bottlebrush squirreltail	5
			Thurber needlegrass	5
105: Atter	Favorable	800	Antelope bitterbrush	20
	Normal	500	Marlahan mustard	15
	Unfavorable	300	California brome	15
			Idaho fescue	10
			Oak	10
			Cheatgrass	10
			Sulphurflower	10
			Bottlebrush squirreltail	5
			Thurber needlegrass	5
106: Atter	Favorable	500	Antelope bitterbrush	20
	Normal	300	Marlahan mustard	15
	Unfavorable	200	California brome	15
			Idaho fescue	10
			Oak	10
			Cheatgrass	10
			Sulphurflower	10
			Bottlebrush squirreltail	5
			Thurber needlegrass	5
107*, 108*:				
Avis	Favorable	900	Snowbrush ceanothus	25
	Normal	400	Sierra chinquapin	25
	Unfavorable	250	Bearberry manzanita	10
			Oregon-grape	5
			Poison-oak	5
			Blueblossom ceanothus	5
			Snowberry	5
			Carex	5
Oosen	Favorable	900	Sierra chinquapin	25
	Normal	500	Greenleaf manzanita	20
	Unfavorable	300	Squawcarpet	15
			Ceanothus	10
			Snowberry	10
109*:				
Avis	Favorable	900	Snowbrush ceanothus	25
	Normal	400	Sierra chinquapin	25
	Unfavorable	250	Bearberry manzanita	10
			Oregon-grape	5
			Poison-oak	5
			Blueblossom ceanothus	5
			Snowberry	5
			Carex	5
Lava flows.				

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
110, 111 Bogus	Favorable Normal Unfavorable	900 600 500	Roundleaf snowberry Lupine Needlegrass Vetch Strawberry Fescue Bluegrass	60 10 10 5 5 5 5
115 Boomer	Favorable Normal Unfavorable	1,000 600 400	California black oak Bluegrass Mountain brome Blue wildrye Needlegrass Buckbrush Brackenfern Greenleaf manzanita Deerbrush Common snowberry	10 10 10 10 10 5 5 5 5 5
116*:				
Boomer	Favorable Normal Unfavorable	1,000 600 400	California black oak Bluegrass Mountain brome Blue wildrye Needlegrass Buckbrush Brackenfern Greenleaf manzanita Deerbrush Common snowberry	10 10 10 10 10 5 5 5 5 5
Neuns	Favorable Normal Unfavorable	700 400 200	Manzanita Squawcarpet Deerbrush Sierra chinquapin Tanoak Oak Serviceberry Dogwood Buckbrush California black oak Brackenfern	15 15 10 10 10 5 5 5 5 5 5
117 Boomer Variant	Favorable Normal Unfavorable	600 400 250	Thurber needlegrass Oak Vetch Birchleaf mountainmahogany Manzanita	40 40 10 5 5
118 Boomer Variant	Favorable Normal Unfavorable	400 300 100	Needlegrass Ceanothus Birchleaf mountainmahogany Vetch Gooseberry Rabbitbrush Lupine	40 20 10 10 10 5 5
119*, 120*, 121*:				
Chaix	Favorable Normal Unfavorable	900 600 400	Manzanita Buckbrush Mountain misery Canyon live oak California black oak Mountain brome Pine bluegrass	20 15 15 10 10 5 5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
119*, 120*, 121*:				
Chawanakee	Favorable	700	Manzanita	30
	Normal	400	Buckbrush	20
	Unfavorable	300	Mountain misery	10
125, 126	Favorable	900	Manzanita	25
Deetz	Normal	700	Squawcarpet	15
	Unfavorable	500	Bitterbrush	10
			Bluegrass	10
127, 128	Favorable	800	Manzanita	25
Deetz	Normal	600	Squawcarpet	15
	Unfavorable	500	Bitterbrush	10
			Bluegrass	10
143*, 144*:				
Dubakella	Favorable	1,000	Bluebunch wheatgrass	35
	Normal	600	Bottlebrush squirreltail	25
	Unfavorable	300	California scrub oak	5
			Manzanita	5
			Buckbrush	5
			Leather oak	5
			Hog fennel	5
			Rubber rabbitbrush	5
Ipish	Favorable	1,200	Beardless wheatgrass	70
	Normal	1,000	Buckwheat	10
	Unfavorable	750	Idaho fescue	5
			Bottlebrush squirreltail	5
			Buckbrush	5
164*, 165*:				
Kindig	Favorable	600	Oak	70
	Normal	300	Deerbrush	10
	Unfavorable	200	Sulphurflower	5
			Manzanita	5
			Fescue	5
Neuns	Favorable	700	Manzanita	15
	Normal	400	Squawcarpet	15
	Unfavorable	200	Deerbrush	10
			Sierra chinquapin	10
			Tanoak	10
			Oak	5
			Serviceberry	5
			Dogwood	5
			Buckbrush	5
			California black oak	5
			Brackenfern	5
166	Favorable	500	Deerbrush	30
Kinkel	Normal	400	Needlegrass	20
	Unfavorable	200	Buckbrush	10
			Common snowberry	10
			Mountain brome	5
			Western yarrow	5
			Canby bluegrass	5
			California brome	5
183*, 184*:				
Marpa	Favorable	1,000	Vetch	30
	Normal	600	Western mountainmahogany	30
	Unfavorable	400	Tall Oregon-grape	10
			Needlegrass	5
			Mustard	5
			Larkspur	5
			Mountain brome	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
183*, 184*:				
Kinkel	Favorable	500	Deerbrush	30
	Normal	400	Needlegrass	20
	Unfavorable	200	Buckbrush	10
			Common snowberry	10
			Mountain brome	5
			Western yarrow	5
			Canby bluegrass	5
			California brome	5
Boomer	Favorable	1,000	California black oak	10
	Normal	600	Bluegrass	10
	Unfavorable	400	Mountain brome	10
			Blue wildrye	10
			Needlegrass	10
			Buckbrush	5
			Brackenfern	5
			Greenleaf manzanita	5
			Deerbrush	5
			Common snowberry	5
196*:				
Neer	Favorable	1,600	Manzanita	50
	Normal	900	Sierra chinquapin	10
	Unfavorable	600	Serviceberry	10
			Snowbrush ceanothus	5
			Needlegrass	5
			Bluegrass	5
			Wheatgrass	5
Ponto	Favorable	2,500	Manzanita	40
	Normal	1,800	Sierra chinquapin	10
	Unfavorable	1,500	Serviceberry	10
			Whitethorn ceanothus	5
			Bitter cherry	5
			Snowbrush ceanothus	5
			Deerbrush	5
			Squawcarpet	5
			Tanoak	5
			Mountain brome	5
197*:				
Neer	Favorable	1,800	Manzanita	40
	Normal	1,200	Antelope bitterbrush	10
	Unfavorable	1,000	Sierra chinquapin	10
			Serviceberry	5
			Snowbrush ceanothus	5
			Needlegrass	5
			Bluegrass	5
			Bluebunch wheatgrass	5
Ponto	Favorable	2,600	Manzanita	40
	Normal	1,500	Sierra chinquapin	10
	Unfavorable	1,200	Whitethorn ceanothus	5
			Bitter cherry	5
			Snowbrush ceanothus	5
			Deerbrush	5
			Squawcarpet	5
			Tanoak	5
			Antelope bitterbrush	5
			Mountain brome	5
199 Oosen	Favorable	900	Sierra chinquapin	25
	Normal	500	Greenleaf manzanita	20
	Unfavorable	300	Squawcarpet	15
			Ceanothus	10
			Snowberry	10

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
200: Orset	Favorable	1,000	Bottlebrush squirreltail	15
	Normal	800	Needlegrass	10
	Unfavorable	600	Cheatgrass	10
			Lupine	10
			Antelope bitterbrush	10
			Big sagebrush	5
			Gooseberry	5
			Rabbitbrush	5
			Ponderosa pine	5
			Douglas-fir	5
			Squawcarpet	5
201, 202, 203: Pinehurst	Favorable	2,500	Deerbrush	30
	Normal	1,800	Snowbrush ceanothus	5
	Unfavorable	1,500	Bearberry	5
			Bitter cherry	5
			Serviceberry	5
			Snowberry	5
			Idaho fescue	5
			Needlegrass	5
			Buckwheat	5
			Lupine	5
			Mountain brome	5
			Squawcarpet	5
204, 205: Pinehurst Variant	Favorable	800	Deerbrush	15
	Normal	500	Squawcarpet	10
	Unfavorable	300	Fescue	10
			Bluegrass	10
			California black oak	5
			Mountainmahogany	5
			Arrowleaf balsamroot	5
			Carex	5
			Lupine	5
			Snowberry	5
			Bottlebrush squirreltail	5
			Junegrass	5
			Serviceberry	5
208: Ponto	Favorable	2,600	Manzanita	40
	Normal	1,500	Sierra chinquapin	10
	Unfavorable	1,200	Whitethorn ceanothus	5
			Bitter cherry	5
			Snowbrush ceanothus	5
			Deerbrush	5
			Squawcarpet	5
			Tanoak	5
			Antelope bitterbrush	5
			Mountain brome	5
209*:				
Ponto	Favorable	2,600	Manzanita	40
	Normal	1,500	Sierra chinquapin	10
	Unfavorable	1,200	Whitethorn ceanothus	5
			Bitter cherry	5
			Snowbrush ceanothus	5
			Deerbrush	5
			Squawcarpet	5
			Tanoak	5
			Antelope bitterbrush	5
			Mountain brome	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
209*:				
Neer	Favorable	1,800	Manzanita	40
	Normal	1,200	Antelope bitterbrush	10
	Unfavorable	1,000	Sierra chinquapin	10
			Serviceberry	5
			Snowbrush ceanothus	5
			Needlegrass	5
			Bluegrass	5
			Bluebunch wheatgrass	5
225	Favorable	1,200	Bottlebrush squirreltail	40
Sheld	Normal	900	Snowbrush ceanothus	40
	Unfavorable	700	Fiddleneck	5
			Sage	5
			California brome	5
226*, 227*:				
Sheld	Favorable	1,200	Bottlebrush squirreltail	40
	Normal	900	Snowbrush ceanothus	40
	Unfavorable	700	Fiddleneck	5
			Sage	5
			California brome	5
Iller	Favorable	900	Sierra chinquapin	25
	Normal	500	Snowberry	20
	Unfavorable	300	Strawberry	10
			Thistle	10
			Gooseberry	5
			California brome	5
			Bedstraw	5
			Squawcarpet	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
112, 113, 114. Bonnet	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Black locust, Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress.	---
122, 123. Copsey	---	Golden willow	Russian-olive, American plum.	Willow, Lombardy poplar, black cottonwood.	---
124. Copsey	---	Golden willow	Russian-olive, American plum.	Willow, Lombardy poplar, black cottonwood.	---
129. Delaney	---	Lilac, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Black locust, Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress.	---
132, 133. Delaney	---	Lilac, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Black locust, Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress.	---
134. Delaney Variant	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm,	Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress, black locust.	---
136, 137. Diyou	---	Golden willow, rose.	Russian-olive, American plum.	Willow, Lombardy poplar, Fremont cottonwood.	---
139, 140, 141, 142. Dotta	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	Russian-olive, Lombardy poplar, American plum, honeylocust, Siberian elm, Arizona cypress.	Ponderosa pine, giant sequoia, black locust.	---
155. Hilt	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Black locust, Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress.	---
161. Jenny	Redosier dogwood, Sierra currant.	Siberian peashrub, lilac, American plum.	Russian-olive, Rocky Mountain juniper.	Golden willow, black locust, honeylocust, Lombardy poplar.	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
169, 170. Lassen	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Black locust, Lombardy poplar, ponderosa pine, honeylocust, giant sequoia, Arizona cypress.	---
182. Louie Variant	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	American plum, Siberian elm.	Lombardy poplar, ponderosa pine, honeylocust, Arizona cypress, black locust.	---
189, 190, 191. Medford	---	Fourwing saltbush, Siberian peashrub, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Lombardy poplar, ponderosa pine, honeylocust, black locust, Arizona cypress.	---
198. Odas	---	Golden willow, rose, pampasgrass.	Russian-olive, American plum.	Lombardy poplar, Fremont cottonwood, willow.	---
206. Pit	---	Golden willow, rose, pampasgrass.	Russian-olive	Willow, Lombardy poplar, Fremont cottonwood.	---
210, 211. Redola	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	Russian-olive, American plum.	Arizona cypress, ponderosa pine, honeylocust, black locust.	---
217, 218, 219, 220. Salisbury	---	Lilac, Siberian peashrub, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Lombardy poplar, honeylocust, Arizona cypress.	Ponderosa pine, black locust.
221. Salisbury	---	Lilac, Siberian peashrub, Tatarian honeysuckle.	Russian-olive, American plum, Siberian elm.	Lombardy poplar, ponderosa pine, honeylocust, black locust, Arizona cypress.	---
223. Settlemeyer	---	Golden willow, pampasgrass, rose.	Russian-olive	Lombardy poplar, willow, Fremont cottonwood.	---
224. Settlemeyer Variant	---	Golden willow, rose, pampasgrass.	Russian-olive	Fremont cottonwood, Lombardy poplar, willow.	---
229, 230, 231. Stoner	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	Russian-olive, American plum, Siberian elm.	Lombardy poplar, honeylocust, Arizona cypress.	Ponderosa pine, giant sequoia, black locust.
232, 233. Terwilliger	---	Siberian peashrub, Tatarian honeysuckle, fourwing saltbush.	Russian-olive, American plum, Siberian elm.	Lombardy poplar, honeylocust, Arizona cypress.	Ponderosa pine, giant sequoia, black locust.

TABLE 11.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
101 Asta	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
102 Asta	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
103 Asta	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
104 Atter	Severe: floods, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
105 Atter	Severe: floods, large stones.	Severe: large stones.	Severe: large stones, small stones.	Severe: large stones.
106 Atter	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
107*:				
Avis	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.
Oosen	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
108*:				
Avis	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
Oosen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
109*:				
Avis	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.
Lava flows.				
110 Bogus	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
111 Bogus	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
112 Bonnet	Slight	Slight	Moderate: small stones.	Moderate: dusty.
113, 114 Bonnet	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: dusty.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
115 Boomer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
116*:				
Boomer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neuns	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
117 Boomer Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
118 Boomer Variant	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: large stones, slope.
119*:				
Chaix	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Chawanakee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
120*, 121*:				
Chaix	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Chawanakee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
122 Copsey	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey.	Severe: wetness, too clayey.
123 Copsey	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: small stones, too clayey.	Severe: wetness, too clayey.
124 Copsey	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: large stones, small stones.	Severe: wetness, too clayey.
125 Deetz	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
126 Deetz	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
127 Deetz	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, large stones.	Moderate: large stones.
128 Deetz	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: large stones, slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
129 Delaney	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
130 Delaney	Severe: too sandy.	Severe: too sandy.	Severe: small stones, too sandy.	Severe: too sandy.
131 Delaney	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
132 Delaney	Slight	Slight	Moderate: small stones.	Slight.
133 Delaney	Slight	Slight	Moderate: slope, small stones.	Slight.
134 Delaney Variant	Severe: floods.	Moderate: floods, percs slowly.	Severe: floods.	Severe: erodes easily.
135*:				
Deven	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Rubble land.				
136 Diyou	Severe: floods.	Moderate: wetness, percs slowly.	Moderate: small stones, wetness, floods.	Slight.
137 Diyou	Severe: floods.	Moderate: percs slowly.	Moderate: small stones, percs slowly.	Slight.
138 Diyou	Severe: floods.	Moderate: wetness, percs slowly.	Moderate: small stones, wetness, percs slowly.	Severe: erodes easily.
139 Dotta	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Moderate: dusty.
140 Dotta	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
141, 142 Dotta	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: dusty.
143*:				
Dubakella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Ipish	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
144*:				
Dubakella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
144*:				
Ipish	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
145*. Dumps				
146 Duzel	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: dusty.
147 Duzel	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: dusty.
148*:				
Duzel	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Jilson	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Facey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
149 Esro	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, erodes easily.
150 Esro	Severe: floods.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: erodes easily.
151 Etsel	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
152 Facey	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
153 Gazelle	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, erodes easily.
154 Gazelle Variant	Severe: floods, wetness, cemented pan.	Severe: wetness, cemented pan.	Severe: wetness, cemented pan.	Severe: wetness.
155 Hilt	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
156 Hilt	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
157 Hilt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
158*:				
Hilt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
158*: Rock outcrop.				
159 Jenny	Moderate: too clayey.	Moderate: too clayey.	Moderate: small stones.	Moderate: too clayey.
160 Jenny	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
161 Jenny	Moderate: large stones.	Moderate: large stones.	Severe: large stones, slope.	Moderate: too clayey.
162 Jilson	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
163*: Jilson	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Duzel	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
164*, 165*: Kindig	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Neuns	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
166 Kinkel	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
167 Kuck	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight.
168 Kuck	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
169 Lassen	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, small stones, too clayey.	Moderate: too clayey.
170 Lassen	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
171 Lassen	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.	Moderate: large stones.
172*: Lassen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
172*:				
Kuck	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
173*:				
Lassen	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
Kuck	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
174*:				
Lassen	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
Rock outcrop.				
Kuck	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
175*. Lava flows				
176*:				
Lava flows.				
Xerorthents.				
177*:				
Lithic Haploxerolls.				
Rock outcrop.				
178*:				
Lithic Xerorthents.				
Rock outcrop.				
179 Louie	Moderate: dusty.	Moderate: dusty.	Moderate: small stones.	Moderate: dusty.
180 Louie	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, cemented pan.	Moderate: dusty.
181 Louie	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: dusty.
182 Louie Variant	Slight	Slight	Moderate: slope, cemented pan.	Slight.
183*:				
Marpa	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: dusty.
Kinkel	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
183*:				
Boomer	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: dusty.
184*:				
Marpa	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Kinkel	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Boomer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
185 Mary	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
186 Mary	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
187 Mary	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
188*:				
Mary	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
189 Medford	Slight	Slight	Moderate: small stones.	Slight.
190 Medford	Slight	Slight	Moderate: small stones, slope.	Slight.
191 Medford	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
192 Montague	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
193 Montague	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
194 Montague	Moderate: large stones, too clayey.	Moderate: large stones, too clayey.	Severe: large stones.	Moderate: large stones, too clayey.
195 Montague Variant	Severe: too clayey, depth to rock, cemented pan.	Severe: too clayey, depth to rock, cemented pan.	Severe: too clayey, depth to rock.	Severe: too clayey.
196*:				
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
196*:				
Ponto	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
197*:				
Neer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
198 Odas	Severe: floods.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.
199 Oosen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
200 Orset	Slight	Slight	Moderate: slope, small stones.	Slight.
201 Pinehurst	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: large stones, dusty.
202 Pinehurst	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones, slope, dusty.
203 Pinehurst	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
204 Pinehurst Variant	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.
205 Pinehurst Variant	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
206 Pit	Severe: floods.	Moderate: wetness, too clayey.	Moderate: slope, wetness, floods.	Slight.
207*:				
Plutos	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.				
208 Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
209*:				
Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Neer	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
210 Redola	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
211 Redola	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
212*. Riverwash				
213*: Rock outcrop.				
Dubakella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
214*: Rock outcrop.				
Louie	Moderate: large stones.	Moderate: large stones.	Severe: slope.	Moderate: dusty.
215*: Rock outcrop.				
Terwilliger	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
216*. Rock outcrop				
217 Salisbury	Slight	Slight	Moderate: small stones.	Slight.
218 Salisbury	Slight	Slight	Moderate: slope, small stones, cemented pan.	Slight.
219 Salisbury	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
220 Salisbury	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight.
221 Salisbury	Moderate: large stones.	Moderate: large stones.	Severe: large stones, small stones.	Moderate: large stones.
222 Settlemeyer	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.
223 Settlemeyer	Severe: floods.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, floods.	Severe: erodes easily.
224 Settlemeyer Variant	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, erodes easily.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
225 Sheld	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.
226*:				
Sheld	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Iller	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope.
227*:				
Sheld	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Iller	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
228 Snell	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
229, 230 Stoner	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
231 Stoner	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
232 Terwilliger	Slight	Slight	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.
233 Terwilliger	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
234, 235 Terwilliger	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
236 Uhlig Variant	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
237*:				
Weitchpec Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Rock outcrop.				
238*. Xerofluvents				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
101----------------- Asta	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
102----------------- Asta	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
103----------------- Asta	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
104----------------- Atter	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Good.
105----------------- Atter	Very poor.	Very poor.	Good	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Good.
106----------------- Atter	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good.
107*, 108*:												
Avis----------------	Poor	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Oosen---------------	Very poor.	Poor	Good	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	Fair.
109*:												
Avis----------------	Poor	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Poor.
Lava flows.												
110, 111------------ Bogus	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
112, 113, 114------- Bonnet	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Poor	Good.
115----------------- Boomer	Poor	Fair	Good	---	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
116*:												
Boomer--------------	Very poor.	Very poor.	Good	---	Good	---	Very poor.	Very poor.	Poor	Poor	Very poor.	---
Neuns---------------	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
117----------------- Boomer Variant	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
118----------------- Boomer Variant	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
119*, 120*, 121*:												
Chaix---------------	Very poor.	Very poor.	Good	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	Good.
Chawanakee----------	Very poor.	Poor	Good	Fair	Poor	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good.
122, 123------------ Copsey	Fair	Fair	Good	Fair	Fair	Good	Poor	Very poor.	Fair	Fair	Very poor.	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
124-----------------Copsey	Fair	---	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	---
125, 126------------Deetz	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
127, 128------------Deetz	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
129-----------------Delaney	Fair	Fair	Good	Poor	Poor	Good	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good.
130-----------------Delaney	Poor	Poor	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good.
131-----------------Delaney	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair.
132, 133------------Delaney	Fair	Fair	Good	Poor	Poor	Good	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good.
134-----------------Delaney Variant	Fair	Fair	Good	Poor	Poor	Good	Poor	Very poor.	Fair	Very poor.	Very poor.	Good.
135*:												
Deven----------------	Poor	Fair	Good	---	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rubble land.												
136-----------------Diyou	Fair	Good	Good	Good	Poor	Good	Good	Good	Good	Very poor.	Good	Good.
137-----------------Diyou	Good	Good	Good	---	---	Good	Good	Good	Good	---	Good	Good.
138-----------------Diyou	Fair	Good	Good	Good	Poor	Good	Good	Good	Good	Very poor.	Good	Good.
139-----------------Dotta	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
140-----------------Dotta	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
141-----------------Dotta	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
142-----------------Dotta	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
143*, 144*:												
Dubakella-----------	Very poor.	Very poor.	Good	Poor	Poor	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Ipish---------------	Very poor.	Very poor.	Fair	Poor	Poor	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
145*. Dumps												
146, 147------------Duzel	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
148*:												
Duzel---------------	Very poor.	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Poor	Very poor.	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
148*:												
Jilson	Very poor.	Very poor.	Good	Poor	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Facey	Poor	Fair	Good	---	Poor	Good	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good.
149 Esro	Poor	Poor	Good	---	---	Good	Good	Good	Poor	---	Good	Good.
150 Esro	Poor	Fair	Good	---	---	Good	Fair	Good	Fair	---	Fair	Good.
151 Etsel	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
152 Facey	Fair	Good	Good	---	Poor	Good	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good.
153 Gazelle	Very poor.	Fair	Good	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Good	Good.
154 Gazelle Variant	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair	Good	Good	Fair	Very poor.	Good	Fair.
155 Hilt	Good	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
156 Hilt	Poor	Fair	Good	Poor	Poor	Good	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
157 Hilt	Poor	Poor	Good	Poor	Very poor.	Good	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good.
158*:												
Hilt	Poor	Poor	Good	Poor	Very poor.	Good	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good.
Rock outcrop.												
159 Jenny	Good	Good	Good	Poor	Poor	Poor	Good	Fair	Good	Poor	Fair	Good.
160 Jenny	Good	Good	Good	Poor	Poor	Poor	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
161 Jenny	Good	Good	Good	Poor	Poor	Good	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
162 Jilson	Very poor.	Very poor.	Good	Poor	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
163*:												
Jilson	Very poor.	Very poor.	Good	Poor	Poor	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Duzel	Good	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
164*, 165*:												
Kindig	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Neuns	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
166 Kinkel	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
167, 168 Kuck	Good	Good	Good	Poor	Poor	Fair	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
169, 170 Lassen	Fair	Good	Good	Poor	Poor	Poor	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
171 Lassen	Poor	Fair	Good	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
172*:												
Lassen	Poor	Fair	Good	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
Kuck	Poor	Fair	Good	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
173*:												
Lassen	Poor	Fair	Good	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
Kuck	Fair	Good	Good	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
174*:												
Lassen	Poor	Fair	Good	Poor	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
Rock outcrop.												
Kuck	Fair	Good	Good	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Good.
175*. Lava flows												
176*:												
Lava flows.												
Xerorthents.												
177*:												
Lithic Haploxerolls.												
Rock outcrop.												
178*:												
Lithic Xerorthents.												
Rock outcrop.												
179 Louie	Good	Good	Good	Poor	Poor	Good	Good	Fair	Good	Very poor.	Fair	Good.
180 Louie	Good	Good	Good	Poor	Poor	Good	Very poor.	Very poor.	Good	Very poor.	Very poor.	Good.
181 Louie	Fair	Good	Good	Poor	Poor	Good	Very poor.	Very poor.	Good	Very poor.	Very poor.	Good.
182 Louie Variant	Fair	Good	Good	---	Poor	Fair	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
183*:												
Marpa	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Kinkel	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Boomer	Fair	Good	Good	---	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
184*:												
Marpa	Fair	Good	Good	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Kinkel	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Boomer	Very poor.	Poor	Good	---	Good	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
185, 186 Mary	Fair	Good	Good	Fair	Very poor.	Good	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good.
187 Mary	Poor	Poor	Good	Fair	Very poor.	Good	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good.
188*:												
Mary	Poor	Poor	Good	Fair	Very poor.	Good	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Good.
Rock outcrop.												
189 Medford	Good	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair	Good.
190, 191 Medford	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
192 Montague	Good	Good	Good	---	---	Fair	Good	Good	Good	---	Good	Good.
193 Montague	Good	Good	Good	---	---	Fair	Very poor.	Very poor.	Good	---	Very poor.	Good.
194 Montague	Fair	Fair	Good	---	---	Fair	Very poor.	Very poor.	Good	---	Very poor.	Good.
195 Montague Variant	Poor	Fair	Good	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Good.
196*:												
Neer	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Ponto	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
197*:												
Neer	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Ponto	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
198 Odas	Fair	Good	Good	---	---	Good	Good	Good	Good	---	Good	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
199 Oosen	Very poor.	Poor	Good	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---
200 Orset	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	Good.
201, 202, 203 Pinehurst	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
204, 205 Pinehurst Variant	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
206 Pit	Fair	Good	Good	---	---	Good	Fair	Very poor.	Good	---	Poor	Good.
207*:												
Plutos	Very poor.	Very poor.	Fair	Poor	Fair	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Fair.
Rock outcrop.												
208 Ponto	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
209*:												
Ponto	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Neer	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
210, 211 Redola	Good	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
212*. Riverwash												
213*:												
Rock outcrop.												
Dubakella	Very poor.	Very poor.	Good	Poor	Poor	Good	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
214*:												
Rock outcrop.												
Louie	Fair	Good	Good	Poor	Poor	Good	Very poor.	Very poor.	Good	Very poor.	Very poor.	Good.
215*:												
Rock outcrop.												
Terwilliger	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	Very poor.	---	Good.
216*. Rock outcrop												
217, 218, 219, 220 Salisbury	Poor	Fair	Good	---	--- ---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
221 Salisbury	Poor	Fair	Good	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
222 Settlemeyer	Poor	Fair	Fair	---	---	Good	Good	Good	Fair	---	Good	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
223 Settlemeyer	Good	Good	Good	Good	Poor	Good	Very poor.	Very poor.	Good	Very poor.	Very poor.	Good.
224 Settlemeyer Variant	Fair	Good	Good	---	---	Good	Good	Good	Good	---	Good	Good.
225 Sheld	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
226*, 227*:												
Sheld	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Iller	Very poor.	Poor	Good	Good	Fair	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	Good.
228 Snell	Very poor.	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
229 Stoner	Good	Good	Good	Good	Good	Good	Fair	Poor	Good	Poor	Poor	Good.
230, 231 Stoner	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Poor	Very poor.	Good.
232, 233 Terwilliger	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
234 Terwilliger	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
235 Terwilliger	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
236 Uhlig Variant	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
237*:												
Weitchpec Variant	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Rock outcrop.												
238*. Xerofluvents												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
101 Asta	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
102, 103 Asta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104 Atter	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Moderate: floods, large stones.
105 Atter	Severe: cutbanks cave, large stones.	Severe: floods, large stones.	Severe: floods, large stones.	Severe: large stones.
106 Atter	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
107*, 108*:				
Avis	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Oosen	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
109*:				
Avis	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lava flows.				
110, 111 Bogus	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
112, 113, 114 Bonnet	Severe: cutbanks cave.	Slight	Slight	Slight.
115 Boomer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
116*:				
Boomer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Neuns	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
117, 118 Boomer Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
119*, 120*, 121*:				
Chaix	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
119*, 120*, 121*: Chawanakee	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
122, 123, 124: Copsey	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.
125: Deetz	Severe: cutbanks cave.	Slight	Slight	Slight.
126: Deetz	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.
127: Deetz	Severe: cutbanks cave.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.
128: Deetz	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
129, 130, 131: Delaney	Severe: cutbanks cave.	Slight	Moderate: slope.	Slight.
132, 133: Delaney	Severe: cutbanks cave.	Slight	Slight	Slight.
134: Delaney Variant	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods, frost action.
135*: Deven	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, slope.
Rubble land.				
136: Diyou	Severe: wetness.	Severe: floods.	Severe: floods.	Severe: floods.
137: Diyou	Moderate: wetness.	Severe: floods.	Severe: floods.	Moderate: frost action, shrink-swell, floods.
138: Diyou	Severe: excess humus, wetness.	Severe: floods.	Severe: floods.	Moderate: wetness, floods, frost action.
139: Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
140: Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
141, 142: Dotta	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
143*, 144*: Dubakella	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
143*, 144*:				
Ipish	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
145*. Dumps				
146 Duzel	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
147 Duzel	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: slope, shrink-swell.
148*:				
Duzel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Jilson	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Facey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
149 Esro	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.
150 Esro	Severe: wetness.	Severe: floods.	Severe: floods.	Severe: frost action.
151 Etsel	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
152 Facey	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
153 Gazelle	Severe: cutbanks cave, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.
154 Gazelle Variant	Severe: cemented pan, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.
155 Hilt	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: slope, shrink-swell.
156, 157 Hilt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
158*:				
Hilt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
159 Jenny	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
160: Jenny	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
161: Jenny	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
162: Jilson	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
163*:				
Jilson	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Duzel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
164*, 165*:				
Kindig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neuns	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
166: Kinkel	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
167: Kuck	Moderate: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
168: Kuck	Moderate: depth to rock, slope.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.
169: Lassen	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
170, 171: Lassen	Severe: depth to rock, cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
172*:				
Lassen	Severe: depth to rock, cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
Kuck	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell, low strength.
173*:				
Lassen	Severe: depth to rock, cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
Kuck	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, low strength, shrink-swell.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
174*:				
Lassen	Severe: depth to rock, cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
Rock outcrop.				
Kuck	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, low strength, shrink-swell.
175*. Lava flows				
176*: Lava flows.				
Xerorthents.				
177*: Lithic Haploxerolls.				
Rock outcrop.				
178*: Lithic Xerorthents.				
Rock outcrop.				
179 Louie	Severe: cutbanks cave.	Slight	Slight	Slight.
180 Louie	Severe: cutbanks cave.	Slight	Moderate: slope.	Slight.
181 Louie	Severe: cutbanks cave.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.
182 Louie Variant	Severe: cemented pan.	Moderate: shrink-swell, cemented pan.	Moderate: shrink-swell, slope, cemented pan.	Moderate: cemented pan, shrink-swell.
183*:				
Marpa	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
Kinkel	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Boomer	Moderate: slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
184*:				
Marpa	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kinkel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
184*:				
Boomer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
185 Mary	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.
186 Mary	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Severe: low strength.
187 Mary	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
188*:				
Mary	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Rock outcrop.				
189, 190 Medford	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
191 Medford	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
192, 193, 194 Montague	Severe: cemented pan, cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
195 Montague Variant	Severe: depth to rock, cemented pan.	Severe: shrink-swell, cemented pan.	Severe: shrink-swell, cemented pan.	Severe: cemented pan, low strength, shrink-swell.
196*, 197*:				
Neer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
198 Odas	Severe: wetness.	Severe: floods.	Severe: floods.	Moderate: wetness, floods.
199 Oosen	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.
200 Orset	Slight	Slight	Moderate: slope.	Moderate: frost action.
201 Pinehurst	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
202, 203 Pinehurst	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
204. Pinehurst Variant	Moderate: depth to rock, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: shrink-swell, large stones.
205. Pinehurst Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
206. Pit	Severe: cutbanks cave, wetness.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: low strength, floods, frost action.
207*:				
Plutos	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
208. Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
209*:				
Ponto	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Neer	Moderate: depth to rock, slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
210. Redola	Severe: cutbanks cave.	Slight	Slight	Moderate: frost action.
211. Redola	Severe: cutbanks cave.	Slight	Moderate: slope.	Moderate: frost action.
212*. Riverwash				
213*:				
Rock outcrop.				
Dubakella	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
214*:				
Rock outcrop.				
Louie	Severe: cutbanks cave.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.
215*:				
Rock outcrop.				
Terwilliger	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
216*. Rock outcrop				

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
217, 218: Salisbury	Severe: cemented pan.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
219, 220, 221: Salisbury	Severe: cemented pan.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
222: Settlemeyer	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.
223: Settlemeyer	Severe: wetness.	Severe: floods.	Severe: floods.	Severe: low strength, floods.
224: Settlemeyer Variant	Severe: wetness.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: low strength, wetness, floods.
225: Sheld	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
226*, 227*:				
Sheld	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Iller	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
228: Snell	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.
229, 230: Stoner	Slight	Slight	Slight	Slight.
231: Stoner	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
232: Terwilliger	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
233: Terwilliger	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
234, 235: Terwilliger	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
236: Uhlig Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
237*:				
Weitchpec Variant	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.				
238*. Xerofluvents				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101----------------- Asta	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: small stones, slope.
102----------------- Asta	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
103----------------- Asta	Severe: slope.	Severe: large stones, slope.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
104----------------- Atter	Severe: poor filter.	Severe: seepage, floods.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, large stones.
105----------------- Atter	Severe: poor filter, large stones.	Severe: seepage, floods, large stones.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, large stones.
106----------------- Atter	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, large stones.
107*, 108*:					
Avis---------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Oosen--------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
109*:					
Avis---------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Lava flows.					
110, 111------------ Bogus	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
112, 113, 114------- Bonnet	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
115----------------- Boomer	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
116*:					
Boomer-------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
116*:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
117 Boomer Variant	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
118 Boomer Variant	Severe: slope.	Severe: seepage, slope, large stones.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
119*, 120*, 121*:					
Chaix	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Chawanakee	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
122, 123, 124 Copsey	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, small stones.
125 Deetz	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
126, 127 Deetz	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
128 Deetz	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
129, 130 Delaney	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
131 Delaney	Severe: poor filter.	Severe: seepage, slope.	Severe: depth to rock, seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
132, 133 Delaney	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
134 Delaney Variant	Severe: floods, poor filter.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Fair: thin layer.
135*:					
Deven	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
135*: Rubble land.					
136----------------- Diyou	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: too clayey, wetness.
137----------------- Diyou	Severe: wetness, percs slowly.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
138----------------- Diyou	Severe: wetness, percs slowly, poor filter.	Severe: seepage, floods, excess humus.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
139, 140------------ Dotta	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey.
141, 142------------ Dotta	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Poor: small stones.
143*, 144*:					
Dubakella----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
Ipish--------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
145*. Dumps					
146, 147------------ Duzel	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
148*:					
Duzel--------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Jilson-------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Facey--------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
149----------------- Esro	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
150----------------- Esro	Severe: wetness, percs slowly.	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
151----------------- Etsel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
152: Facey	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: area reclaim, too clayey, slope.
153: Gazelle	Severe: floods, cemented pan, wetness.	Severe: seepage, cemented pan, floods.	Severe: floods, wetness.	Severe: floods, cemented pan, wetness.	Poor: area reclaim, wetness.
154: Gazelle Variant	Severe: floods, cemented pan, wetness.	Severe: cemented pan, floods, wetness.	Severe: floods, wetness.	Severe: floods, cemented pan, wetness.	Poor: area reclaim, wetness.
155: Hilt	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock, seepage.	Poor: area reclaim.
156, 157: Hilt	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
158*:					
Hilt	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Rock outcrop.					
159: Jenny	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
160: Jenny	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
161: Jenny	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
162: Jilson	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
163*:					
Jilson	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Duzel	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
164*, 165*:					
Kindig	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
164*, 165*:					
Neuns	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
166 Kinkel	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
167 Kuck	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
168 Kuck	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
169 Lassen	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
170, 171 Lassen	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
172*, 173*:					
Lassen	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Kuck	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
174*:					
Lassen	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
Kuck	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
175*. Lava flows					
176*:					
Lava flows.					
Xerorthents.					
177*:					
Lithic Haploxerolls.					
Rock outcrop.					
178*:					
Lithic Xerorthents.					

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
178*:					
Rock outcrop.					
179, 180------------ Louie	Severe: cemented pan, percs slowly, poor filter.	Severe: seepage, cemented pan.	Severe: seepage, too sandy.	Severe: cemented pan, seepage.	Poor: area reclaim, seepage, too sandy.
181---------------- Louie	Severe: cemented pan, percs slowly, poor filter.	Severe: seepage, cemented pan.	Severe: seepage, too sandy, large stones.	Severe: cemented pan, seepage.	Poor: area reclaim, seepage, too sandy.
182---------------- Louie Variant	Severe: cemented pan, percs slowly.	Severe: seepage, cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan, seepage.	Poor: area reclaim.
183*:					
Marpa--------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Kinkel-------------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
Boomer-------------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: area reclaim, too clayey, slope.
184*:					
Marpa--------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Kinkel-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Boomer-------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
185---------------- Mary	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
186---------------- Mary	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
187---------------- Mary	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
188*:					
Mary---------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
189---------------- Medford	Severe: percs slowly.	Slight-----------	Severe: too clayey.	Slight-----------	Poor: too clayey.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
190 Medford	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
191 Medford	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
192, 193, 194 Montague	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: area reclaim, too clayey, hard to pack.
195 Montague Variant	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan.	Severe: depth to rock, cemented pan, too clayey.	Severe: depth to rock, cemented pan.	Poor: area reclaim, too clayey, hard to pack.
196*, 197*:					
Neer	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Ponto	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
198 Odas	Severe: wetness.	Severe: seepage, floods, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: small stones, wetness.
199 Oosen	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
200 Orset	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
201 Pinehurst	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
202, 203 Pinehurst	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
204 Pinehurst Variant	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, small stones.
205 Pinehurst Variant	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
206 Pit	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, hard to pack.
207*:					
Plutos	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, too sandy, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
208: Ponto	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
209*:					
Ponto	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
Neer	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
210: Redola	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
211: Redola	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
212*. Riverwash					
213*:					
Rock outcrop.					
Dubakella	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
214*:					
Rock outcrop.					
Louie	Severe: cemented pan, percs slowly, poor filter.	Severe: seepage, cemented pan, slope.	Severe: seepage, too sandy, large stones.	Severe: cemented pan, seepage.	Poor: area reclaim, seepage, too sandy.
215*:					
Rock outcrop.					
Terwilliger	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
216*. Rock outcrop					
217, 218, 219: Salisbury	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, too clayey.	Severe: cemented pan.	Poor: area reclaim, too clayey, hard to pack.
220: Salisbury	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan, too clayey.	Severe: cemented pan.	Poor: area reclaim, too clayey, hard to pack.
221: Salisbury	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, too clayey.	Severe: cemented pan.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
222 Settlemeyer	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, wetness.
223 Settlemeyer	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey.
224 Settlemeyer Variant	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, wetness.
225 Sheld	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: small stones, slope.
226*, 227*:					
Sheld	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Iller	Severe: slope.	Severe: seepage, slope.	Severe: slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
228 Snell	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
229 Stoner	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Poor: small stones.
230 Stoner	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: small stones.
231 Stoner	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
232 Terwilliger	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
233 Terwilliger	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
234, 235 Terwilliger	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
236 Uhlig Variant	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: large stones, slope.
237*: Weitchpec Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
237*:					
Rock outcrop.					
238*.					
Xerofluvents					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101 Asta	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
102 Asta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
103 Asta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
104 Atter	Fair: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, small stones.
105 Atter	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
106 Atter	Fair: large stones, slope.	Probable	Probable	Poor: large stones, area reclaim, slope.
107*:				
Avis	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Oosen	Fair: slope.	Probable	Improbable: too sandy.	Poor: small stones, slope.
108*:				
Avis	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Oosen	Poor: slope.	Probable	Improbable: too sandy.	Poor: small stones, slope.
109*:				
Avis	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Lava flows.				
110, 111 Bogus	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
112, 113, 114 Bonnet	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
115 Boomer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
116*:				
Boomer	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Neuns	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
117 Boomer Variant	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
118 Boomer Variant	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
119*:				
Chaix	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Chawanakee	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
120*, 121*:				
Chaix	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Chawanakee	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
122, 123, 124 Copsey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
125, 126 Deetz	Good	Probable	Probable	Poor: small stones, area reclaim.
127 Deetz	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
128 Deetz	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
129 Delaney	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
130 Delaney	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
131 Delaney	Fair: area reclaim, thin layer.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones.
132, 133 Delaney	Good	Probable	Improbable: too sandy.	Poor: small stones.
134 Delaney Variant	Good	Probable	Improbable: too sandy.	Fair: small stones.
135*:				
Deven	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rubble land.				
136 Diyou	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
137 Diyou	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
138 Diyou	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
139, 140 Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
141, 142 Dotta	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
143*:				
Dubakella	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ipish	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
144*:				
Dubakella	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ipish	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
145*. Dumps				
146, 147 Duzel	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
148*:				
Duzel	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
148*:				
Jilson	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Facey	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
149 Esro	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
150 Esro	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
151 Etsel	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
152 Facey	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
153 Gazelle	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
154 Gazelle Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
155 Hilt	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
156 Hilt	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
157 Hilt	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
158*:				
Hilt	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
159, 160 Jenny	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
161 Jenny	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
162 Jilson	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
163*:				
Jilson	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Duzel	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
164*, 165*:				
Kindig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Neuns	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
166 Kinkel	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
167, 168 Kuck	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
169, 170 Lassen	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
171 Lassen	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
172*:				
Lassen	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Kuck	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
173*:				
Lassen	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Kuck	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
174*:				
Lassen	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
174*:				
Kuck	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
175*. Lava flows				
176*: Lava flows.				
Xerorthents.				
177*: Lithic Haploxerolls.				
Rock outcrop.				
178*: Lithic Xerorthents.				
Rock outcrop.				
179, 180 Louie	Good	Probable	Probable	Poor: small stones, area reclaim.
181 Louie	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
182 Louie Variant	Fair: thin layer, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, thin layer.
183*:				
Marpa	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Kinkel	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Boomer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
184*:				
Marpa	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Kinkel	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Boomer	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
185 Mary	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
186 Mary	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
187 Mary	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
188*:				
Mary	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
189, 190, 191 Medford	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
192, 193 Montague	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
194 Montague	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
195 Montague Variant	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
196*:				
Neer	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ponto	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
197*:				
Neer	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ponto	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
198 Odas	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
199 Oosen	Good	Probable	Improbable: too sandy.	Poor: small stones.
200 Orset	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
201 Pinehurst	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
202: Pinehurst	Fair: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
203: Pinehurst	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
204: Pinehurst Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
205: Pinehurst Variant	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
206: Pit	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
207*:				
Plutos	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
208: Ponto	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
209*:				
Ponto	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Neer	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
210, 211: Redola	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
212*. Riverwash				
213*:				
Rock outcrop.				
Dubakella	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
214*:				
Rock outcrop.				
Louie	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
215*:				
Rock outcrop.				
Terwilliger	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
216*. Rock outcrop				
217, 218 Salisbury	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
219, 220, 221 Salisbury	Poor: area reclaim, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
222 Settlemeyer	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
223 Settlemeyer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
224 Settlemeyer Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
225 Sheld	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
226*:				
Sheld	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Iller	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
227*:				
Sheld	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Iller	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
228 Snell	Poor: area reclaim, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
229, 230, 231 Stoner	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
232, 233 Terwilliger	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
234, 235 Terwilliger	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
236------------------- Uhlig Variant	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
237*:				
Weitchpec Variant----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
238*. Xerofluvents				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
101, 102 Asta	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
103 Asta	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, soil blowing, slope.	Large stones, slope.	Large stones, slope.
104, 105 Atter	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
106 Atter	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, fast intake.	Slope, large stones, too sandy.	Large stones, slope, droughty.
107*, 108*:						
Avis	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Oosen	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Slope, too sandy.	Slope, droughty.
109*:						
Avis	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Lava flows.						
110, 111 Bogus	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
112, 113 Bonnet	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Favorable	Droughty.
114 Bonnet	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable	Droughty.
115 Boomer	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope	Slope.
116*:						
Boomer	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope	Slope.
Neuns	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
117 Boomer Variant	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
118 Boomer Variant	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
119*, 120*, 121*:						
Chaix	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
119*, 120*, 121*:						
Chawanakee	Severe: depth to rock, slope.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
122, 123 Copsey	Moderate: slope.	Severe: wetness.	Percs slowly, slope.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
124 Copsey	Moderate: slope.	Severe: wetness.	Percs slowly, large stones, slope.	Large stones, wetness, droughty.	Large stones, wetness.	Large stones, wetness.
125 Deetz	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, fast intake.	Too sandy	Droughty.
126 Deetz	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, fast intake, slope.	Slope, too sandy.	Slope, droughty.
127, 128 Deetz	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, fast intake.	Slope, large stones, too sandy.	Large stones, slope, droughty.
129, 130, 131 Delaney	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
132, 133 Delaney	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
134 Delaney Variant	Severe: seepage.	Severe: piping.	Deep to water	Droughty, erodes easily, floods.	Erodes easily	Erodes easily, droughty.
135*:						
Deven	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Rubble land.						
136 Diyou	Slight	Severe: piping.	Floods	Wetness, floods.	Wetness	Favorable.
137 Diyou	Slight	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
138 Diyou	Moderate: seepage.	Severe: piping.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
139 Dotta	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable	Erodes easily	Erodes easily.
140 Dotta	Moderate: seepage, slope.	Severe: thin layer.	Deep to water	Slope	Erodes easily	Erodes easily.
141 Dotta	Moderate: seepage.	Severe: thin layer.	Deep to water	Droughty	Favorable	Droughty.
142 Dotta	Moderate: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, slope.	Favorable	Droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
143*, 144*:						
Dubakella	Severe: slope.	Severe: thin layer.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ipish	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
145*. Dumps						
146 Duzel	Moderate: depth to rock, slope.	Moderate: thin layer.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
147 Duzel	Severe: slope.	Moderate: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
148*:						
Duzel	Severe: slope.	Moderate: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Jilson	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Facey	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
149 Esro	Moderate: seepage.	Severe: piping, wetness.	Floods, frost action.	Wetness, erodes easily, floods.	Erodes easily, wetness.	Wetness, erodes easily.
150 Esro	Moderate: seepage.	Severe: piping.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
151 Etsel	Severe: depth to rock, slope.	Slight	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
152 Facey	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
153 Gazelle	Severe: seepage.	Severe: piping, wetness.	Cemented pan, floods, cutbanks cave.	Wetness, cemented pan, erodes easily.	Cemented pan, erodes easily, wetness.	Wetness, excess salt, erodes easily.
154 Gazelle Variant	Severe: cemented pan.	Severe: piping, wetness.	Cemented pan, floods.	Wetness, cemented pan, floods.	Cemented pan, erodes easily, wetness.	Wetness, excess salt, erodes easily.
155, 156 Hilt	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
157 Hilt	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
158*:						
Hilt	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
159--- Jenny	Slight---	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly---	Percs slowly.
160--- Jenny	Severe: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
161--- Jenny	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Percs slowly---	Percs slowly.
162--- Jilson	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
163*:						
Jilson---	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Duzel---	Severe: slope.	Moderate: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
164*, 165*:						
Kindig---	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope---	Slope, droughty.
Neuns---	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
166--- Kinkel	Severe: slope.	Moderate: seepage.	Deep to water	Droughty, slope.	Slope---	Slope, droughty.
167--- Kuck	Moderate: depth to rock, slope.	Moderate: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
168--- Kuck	Severe: slope.	Moderate: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
169--- Lassen	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
170--- Lassen	Severe: slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
171--- Lassen	Severe: slope.	Severe: thin layer.	Deep to water	Large stones, droughty, slow intake.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
172*:						
Lassen---	Severe: slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Kuck---	Severe: slope.	Moderate: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
173*:						
Lassen	Severe: slope.	Severe: thin layer.	Deep to water	Large stones, droughty, slow intake.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Kuck	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
174*:						
Lassen	Severe: slope.	Severe: thin layer.	Deep to water	Large stones, droughty, slow intake.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
Kuck	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
175*. Lava flows						
176*: Lava flows.						
Xerorthents.						
177*: Lithic Haploxerolls.						
Rock outcrop.						
178*: Lithic Xerorthents.						
Rock outcrop.						
179 Louie	Severe: seepage.	Severe: seepage.	Deep to water	Cemented pan	Large stones, cemented pan.	Large stones.
180 Louie	Severe: seepage.	Severe: seepage.	Deep to water	Cemented pan, slope.	Large stones, cemented pan.	Large stones.
181 Louie	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, cemented pan.	Large stones, cemented pan.	Large stones, droughty.
182 Louie Variant	Severe: seepage.	Severe: thin layer.	Deep to water	Cemented pan, slope.	Cemented pan, erodes easily.	Erodes easily, cemented pan.
183*, 184*:						
Marpa	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Kinkel	Severe: slope.	Moderate: seepage.	Deep to water	Droughty, slope.	Slope	Slope, droughty.
Boomer	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope	Slope.
185 Mary	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
186 Mary	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
187 Mary	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
188*: Mary	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
189 Medford	Slight	Slight	Deep to water	Favorable	Favorable	Favorable.
190 Medford	Moderate: slope.	Slight	Deep to water	Slope	Favorable	Favorable.
191 Medford	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
192 Montague	Moderate: depth to rock, cemented pan.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, cemented pan.	Depth to rock, cemented pan.
193 Montague	Moderate: depth to rock, cemented pan, slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, cemented pan.	Depth to rock, cemented pan.
194 Montague	Moderate: depth to rock, cemented pan, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slow intake.	Large stones, depth to rock.	Large stones, droughty.
195 Montague Variant	Severe: depth to rock, cemented pan.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Depth to rock, cemented pan.	Depth to rock, cemented pan.
196*: Neer	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ponto	Severe: slope.	Severe: piping.	Deep to water	Droughty, slope.	Slope	Slope, droughty.
197*: Neer	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Ponto	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
198 Odas	Severe: seepage.	Severe: piping, wetness.	Favorable	Wetness, droughty.	Wetness	Droughty.
199 Oosen	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Slope, too sandy.	Slope, droughty.
200 Orset	Moderate: slope.	Severe: piping.	Deep to water	Droughty, slope.	Favorable	Droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
201, 202, 203: Pinehurst	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
204: Pinehurst Variant	Moderate: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
205: Pinehurst Variant	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
206: Pit	Slight	Moderate: thin layer, hard to pack, wetness.	Percs slowly, floods, frost action.	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
207*:						
Plutos	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
Rock outcrop.						
208: Ponto	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
209*:						
Ponto	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Neer	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
210: Redola	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
211: Redola	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
212*. Riverwash						
213*:						
Rock outcrop.						
Dubakella	Severe: slope.	Severe: thin layer.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
214*:						
Rock outcrop.						
Louie	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, cemented pan.	Large stones, cemented pan.	Large stones, droughty.
215*:						
Rock outcrop.						
Terwilliger	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
216*. Rock outcrop						
217----------- Salisbury	Moderate: cemented pan.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan.	Cemented pan---	Cemented pan.
218----------- Salisbury	Moderate: cemented pan, slope.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan, slope.	Cemented pan---	Cemented pan.
219----------- Salisbury	Moderate: cemented pan.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan.	Cemented pan, percs slowly.	Cemented pan, percs slowly.
220----------- Salisbury	Moderate: cemented pan, slope.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan, slope.	Cemented pan, percs slowly.	Cemented pan, percs slowly.
221----------- Salisbury	Moderate: cemented pan, slope.	Severe: thin layer.	Deep to water	Percs slowly, cemented pan.	Large stones, cemented pan.	Large stones.
222----------- Settlemeyer	Moderate: seepage.	Severe: wetness.	Floods---------	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
223----------- Settlemeyer	Moderate: seepage, slope.	Moderate: piping, wetness.	Floods, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
224----------- Settlemeyer Variant	Slight---------	Severe: wetness.	Percs slowly, floods.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
225----------- Sheld	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
226*, 227*:						
Sheld----------	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Iller----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
228----------- Snell	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
229----------- Stoner	Moderate: seepage.	Moderate: thin layer, seepage, piping.	Deep to water	Droughty-------	Favorable------	Droughty.
230----------- Stoner	Moderate: seepage, slope.	Moderate: thin layer, seepage, piping.	Deep to water	Droughty, slope.	Favorable------	Droughty.
231----------- Stoner	Severe: slope.	Moderate: thin layer, seepage, piping.	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.
232----------- Terwilliger	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
233, 234, 235----- Terwilliger	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
236---------------- Uhlig Variant	Severe: slope.	Severe: piping.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
237*:						
Weitchpec Variant	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						
238*. Xerofluvents						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
101, 102--------- Asta	0-13	Gravelly sandy loam.	SM	A-1, A-2	0-10	75-85	50-75	30-45	15-30	20-25	NP-5
	13-60	Loam, silt loam	ML	A-4	0-10	80-100	75-100	60-100	50-85	25-35	5-10
	60-71	Silt loam, loam, very fine sandy loam.	ML	A-4	0-10	80-100	75-100	60-100	50-85	20-35	NP-10
103-------------- Asta	0-13	Cobbly sandy loam	SM	A-1, A-2	20-40	70-85	50-75	30-45	15-30	20-25	NP-5
	13-60	Cobbly loam, cobbly silt loam.	ML	A-4	20-40	80-95	75-85	60-80	50-60	25-35	5-10
	60-71	Cobbly silt loam, cobbly loam, cobbly very fine sandy loam.	ML	A-4	20-40	80-95	75-85	60-80	50-60	20-35	NP-10
104-------------- Atter	0-18	Very gravelly sandy loam.	GM	A-1	0-10	30-55	25-50	20-35	10-20	15-20	NP-5
	18-60	Stratified very cobbly sand to very cobbly loamy sand.	SP-SM, SM	A-1	40-60	60-80	50-75	25-50	5-15	---	NP
105-------------- Atter	0-18	Very cobbly sandy loam.	SM	A-1, A-2	40-60	60-80	50-75	30-50	15-35	15-20	NP-5
	18-60	Stratified very cobbly sand to very cobbly loamy sand.	SP-SM, SM	A-1	40-60	60-80	50-75	25-50	5-15	---	NP
106-------------- Atter	0-23	Very bouldery loamy fine sand.	SM	A-1, A-2	30-50	60-80	60-75	30-60	10-25	---	NP
	23-60	Very bouldery loamy sand, very bouldery sand.	SP-SM, SM	A-1	30-50	60-80	50-75	25-50	5-15	---	NP
107*, 108*: Avis------------	0-13	Very stony sandy loam.	SM	A-2, A-4	25-40	80-95	75-95	40-60	30-50	15-20	NP-5
	13-72	Very gravelly loamy sand, very gravelly sand, very gravelly loamy fine sand.	GP-GM, GM	A-1	10-25	40-55	35-50	15-30	5-15	---	NP
Oosen-----------	0-12	Loamy sand-------	SM	A-2	0-5	90-100	75-100	50-75	15-30	---	NP
	12-28	Loamy sand, loamy fine sand.	SM	A-2	0-5	90-100	75-100	50-75	15-30	---	NP
	28-75	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0-5	90-100	75-100	40-70	5-15	---	NP
109*: Avis------------	0-13	Very stony sandy loam.	SM	A-2, A-4	25-40	80-95	75-95	40-60	30-50	15-20	NP-5
	13-75	Very gravelly loamy sand, very gravelly sand, very gravelly loamy fine sand.	GP-GM, GM	A-1	10-25	40-55	35-50	15-30	5-15	---	NP
Lava flows.											

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
110-------------- Bogus	0-3	Stony loam-------	CL	A-6	10-20	80-100	75-85	60-80	50-70	30-40	10-20
	3-11	Clay loam--------	CL	A-6	0-5	80-100	75-100	60-90	50-85	30-40	10-20
	11-20	Clay loam--------	CL	A-6	5-15	80-95	75-95	60-90	50-85	30-40	10-20
	20-53	Clay loam, clay	CL, CH	A-7	5-15	80-95	75-95	65-95	55-90	40-60	20-35
	53-62	Sandy clay loam, clay loam, sandy clay.	CL, SC	A-6, A-7	0-5	85-95	75-95	60-85	40-60	35-45	15-20
	62	Weathered bedrock	---	---	---	---	---	---	---	---	---
111-------------- Bogus	0-3	Very stony loam	CL	A-6	20-30	80-100	60-75	60-70	50-65	30-40	10-20
	3-11	Clay loam--------	CL	A-6	0-5	80-100	75-100	60-90	50-85	30-40	10-20
	11-20	Clay loam--------	CL	A-6	5-15	80-95	75-95	60-90	50-85	30-40	10-20
	20-53	Clay loam, clay	CL, CH	A-7	5-15	80-95	75-95	65-95	55-90	40-60	20-35
	53-62	Sandy clay loam, clay loam, sandy clay.	CL, SC	A-6, A-7	0-5	85-95	75-95	60-85	40-60	35-45	15-20
112-------------- Bonnet	0-14	Loam-------------	SM, ML	A-4	0	80-95	75-90	60-80	35-60	20-35	NP-10
	14-46	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	0	30-55	25-50	15-40	10-35	20-35	NP-10
	46-61	Stratified extremely gravelly loamy sand to very gravelly loam.	GP, GP-GM, GM	A-1	0	15-40	10-35	5-25	0-15	---	NP
113, 114--------- Bonnet	0-14	Gravelly loam----	SM, GM	A-2, A-4, A-1	0	55-80	50-75	30-50	20-50	20-35	NP-10
	14-46	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	0	30-55	25-50	15-40	10-35	20-35	NP-10
	46-61	Stratified extremely gravelly loamy sand to very gravelly loam.	GP, GP-GM, GM	A-1	0	15-40	10-35	5-25	0-15	---	NP
115-------------- Boomer	0-10	Loam-------------	CL, CL-ML	A-4, A-6	0-5	85-95	75-95	70-80	50-70	25-40	5-15
	10-53	Sandy clay loam, clay loam, silty clay loam.	CL, SC	A-6, A-7	0-5	85-95	75-95	70-85	45-80	30-50	10-25
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
116*:											
Boomer----------	0-10	Loam-------------	CL, CL-ML	A-4, A-6	0-5	85-95	75-95	70-80	50-70	25-40	5-15
	10-53	Sandy clay loam, clay loam, silty clay loam.	CL, SC	A-6, A-7	0-5	85-95	75-95	70-85	45-80	30-50	10-25
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neuns-----------	0-8	Gravelly loam----	SM, GM	A-4	0-5	55-80	50-75	40-60	35-50	15-25	NP-5
	8-35	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117-------------- Boomer Variant	0-25	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-80	35-50	15-20	NP-5
	25-36	Sandy clay loam	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	60-80	50-60	25-35	5-15
	36-50	Loam-------------	ML, CL-ML	A-4	0-5	80-100	75-100	60-80	50-60	25-35	5-10
	50-70	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-80	35-50	15-20	NP-5
	70	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
118 Boomer Variant	0-25	Stony sandy loam	SM	A-4	25-45	90-100	80-100	50-80	35-50	15-20	NP-5
	25-36	Stony sandy clay loam.	CL-ML, CL	A-4, A-6	25-45	90-100	80-100	60-80	50-60	25-35	5-15
	36-50	Stony loam	ML, CL-ML	A-4	25-45	90-100	80-100	60-80	50-60	25-35	5-10
	50-70	Stony sandy loam	SM	A-4	25-45	90-100	80-100	50-80	35-50	15-20	NP-5
	70	Weathered bedrock	---	---	---	---	---	---	---	---	---
119*, 120*, 121*: Chaix	0-4	Gravelly coarse sandy loam.	SM	A-1, A-2	0-5	80-95	50-75	30-50	15-30	---	NP
	4-34	Gravelly coarse sandy loam.	SM	A-1, A-2	0-5	80-95	50-75	30-50	15-30	---	NP
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Chawanakee	0-16	Gravelly coarse sandy loam.	SM	A-1, A-2	0-5	80-95	50-75	30-50	15-30	---	NP
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
122 Copsey	0-18	Clay	CH	A-7	0	80-100	75-100	65-100	55-95	50-65	25-35
	18-60	Gravelly clay	CH	A-7	0-15	60-85	55-75	50-75	50-70	50-65	25-35
123 Copsey	0-18	Gravelly clay	CH	A-7	0-5	60-85	55-75	50-75	50-70	50-65	25-35
	18-60	Gravelly clay	CH	A-7	0-15	60-85	55-75	50-75	50-70	50-65	25-35
124 Copsey	0-18	Cobbly clay	CH	A-7	15-30	70-90	60-80	50-75	50-70	50-65	25-35
	18-60	Cobbly clay	CH	A-7	15-30	70-90	60-80	50-75	50-70	50-65	25-35
125, 126 Deetz	0-7	Gravelly loamy sand.	SM	A-1, A-2	0-5	60-90	50-75	30-60	10-30	---	NP
	7-38	Stratified gravelly loamy sand to sand.	SM, SP-SM	A-1	0-10	60-90	50-75	25-50	5-25	---	NP
	38-65	Stratified gravelly loamy sand to very gravelly sand.	GP-GM, SP-SM, GM, SM	A-1	5-15	40-60	25-50	15-35	5-15	---	NP
127, 128 Deetz	0-7	Stony loamy sand	SM	A-1, A-2	15-30	75-90	60-80	30-60	10-30	---	NP
	7-38	Stratified cobbly loamy sand to sand.	SM, SP-SM	A-1	15-30	75-90	60-80	25-50	5-25	---	NP
	38-65	Stratified very cobbly loamy sand to very gravelly sand.	GP-GM, SP-SM, GM, SM	A-1	40-50	40-60	30-50	15-35	5-15	---	NP
129 Delaney	0-9	Sand	SM, SP-SM	A-1, A-2, A-3	0-10	85-100	75-90	40-70	5-30	---	NP
	9-68	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0-10	85-100	75-90	40-70	5-30	---	NP
130 Delaney	0-9	Gravelly sand	SM, SP-SM	A-1, A-2, A-3	0-10	80-95	70-85	30-60	5-30	---	NP
	9-44	Gravelly sand, gravelly loamy sand.	SM, SP-SM	A-1, A-2, A-3	0-10	80-95	70-85	30-60	5-30	---	NP
	44-68	Very gravelly sand.	GP, GP-GM	A-1	5-15	30-55	25-50	15-35	0-10	---	NP
131 Delaney	0-9	Stony sand	SP-SM, SM	A-1, A-2	5-15	80-95	75-90	30-50	5-30	---	NP
	9-45	Cobbly sand, stony sand.	SP-SM	A-1	5-15	80-95	75-90	30-50	5-10	---	NP
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
132, 133--------- Delaney	0-9	Sandy loam-------	SM	A-2	0-10	85-100	75-90	40-70	25-35	---	NP
	9-68	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0-10	85-100	75-90	40-70	5-30	---	NP
134-------------- Delaney Variant	0-7	Silt-------------	ML	A-4	0	95-100	90-100	85-100	85-95	25-35	NP-5
	7-14	Loamy fine sand	SM	A-4	0	95-100	85-100	60-85	35-50	---	NP
	14-22	Silt-------------	ML	A-4	0	95-100	85-100	80-100	75-95	25-35	NP-5
	22-34	Loamy sand-------	SM	A-2	0	95-100	85-100	50-75	25-35	---	NP
	34-53	Sandy loam-------	SM	A-4	0	95-100	85-100	60-85	35-50	20-25	NP-5
	53-60	Coarse sand------	SP, SP-SM	A-1	0	95-100	85-100	30-50	0-10	---	NP
135*:											
Deven-----------	0-5	Loam-------------	CL-ML, ML	A-4	0	90-100	80-100	75-90	50-75	25-35	5-10
	5-17	Clay loam, clay	CL, CH	A-7	0-5	80-100	75-100	70-95	60-95	40-55	20-30
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rubble land.											
136-------------- Diyou	0-11	Loam-------------	ML	A-4	0-5	80-100	80-100	80-90	50-75	20-35	NP-10
	11-60	Stratified sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	70-95	50-60	25-35	5-15
137-------------- Diyou	0-11	Loam-------------	ML	A-4	0-5	80-100	80-100	80-95	50-75	20-35	NP-10
	11-60	Stratified sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	70-95	50-60	25-35	5-15
138-------------- Diyou	0-11	Loam-------------	ML	A-4	0-5	80-100	80-100	80-95	50-75	20-35	NP-10
	11-40	Stratified sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	70-95	50-60	25-35	5-15
	40-62	Peat-------------	PT	A-8	---	---	---	---	---	---	---
139, 140--------- Dotta	0-15	Loam-------------	ML	A-4	0	80-100	75-100	60-85	50-75	20-35	NP-10
	15-62	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	80-100	75-100	60-85	35-60	30-40	10-15
141, 142--------- Dotta	0-15	Gravelly loam----	SM, GM	A-2, A-4	0-5	55-80	50-75	40-70	30-50	20-35	NP-10
	15-62	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, GC	A-6	0-5	55-80	50-75	40-70	35-50	30-40	10-15
143*, 144*:											
Dubakella-------	0-11	Stony loam-------	SC, SM-SC, CL, CL-ML	A-4, A-6	10-25	85-95	70-85	60-70	40-60	25-40	5-15
	11-36	Very gravelly clay loam, very gravelly clay, very cobbly clay.	GC, SC	A-7	10-30	50-75	35-60	35-60	35-50	40-55	15-30
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ipish-----------	0-2	Gravelly loam----	SM, GM	A-4	0-5	55-80	50-75	45-60	35-50	30-40	5-10
	2-44	Gravelly clay loam.	SC, GC	A-6, A-7	0-5	55-80	50-75	45-65	35-50	30-45	10-20
	44-65	Very gravelly clay loam, very gravelly clay.	GC	A-2	0-10	35-60	25-50	20-50	15-35	30-45	10-20
	65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
145*. Dumps											
146, 147--------- Duzel	0-13	Gravelly loam----	SM-SC, GM-GC	A-4	5-10	55-80	50-75	40-70	35-50	20-30	5-10
	13-30	Gravelly loam, gravelly clay loam.	SC, GC	A-6	5-10	55-80	50-75	40-75	35-50	25-40	10-20
	30-38	Very gravelly loam, very gravelly clay loam.	GC	A-2	5-10	30-60	25-50	20-50	15-35	25-40	10-20
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
148*: Duzel-----------	0-13	Gravelly loam----	SM-SC, GM-GC	A-4	0-10	55-80	50-75	40-70	35-50	20-30	5-10
	13-30	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-10	55-80	50-75	40-75	35-50	25-40	10-20
	30-38	Very gravelly loam, very gravelly clay loam.	GC	A-2	5-10	30-60	25-50	20-50	15-35	25-40	10-20
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
Jilson----------	0-3	Gravelly loam----	SM-SC, GM-GC	A-4	0-5	60-80	50-75	40-70	35-50	20-30	5-10
	3-14	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-5	60-80	50-75	40-75	35-50	30-40	10-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Facey-----------	0-10	Loam-------------	CL-ML, ML	A-4	0	80-100	75-95	60-95	50-70	25-35	5-10
	10-59	Clay loam, loam	CL, SC	A-6	0	60-100	50-100	50-100	40-80	30-40	10-15
	59	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
149, 150--------- Esro	0-32	Silt loam--------	ML	A-4	0	100	95-100	95-100	80-100	30-40	NP-10
	32-46	Silt loam, silty clay loam, clay loam.	ML	A-4, A-6	0	100	95-100	95-100	80-100	30-40	5-15
	46-79	Stratified sandy loam to sandy clay loam.	SM-SC, SC	A-4, A-6	0	85-100	75-100	50-80	35-50	25-35	5-15
151-------------- Etsel	0-7	Very gravelly loam.	GM-GC	A-1, A-2	0-5	35-55	30-50	20-45	15-35	20-30	5-10
	7	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
152-------------- Facey	0-10	Loam-------------	CL-ML, ML	A-4	0	80-100	75-95	60-95	50-70	25-35	5-10
	10-59	Clay loam, loam	CL	A-6	0	80-100	75-100	60-100	50-80	30-40	10-15
	59	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
153-------------- Gazelle	0-11	Silt loam--------	ML	A-4	0	100	95-100	85-100	70-85	25-35	NP-10
	11-25	Silt loam, loam	ML	A-4	0	100	95-100	80-100	60-85	25-35	NP-10
	25-38	Cemented---------	---	---	0	---	---	---	---	---	---
	38-60	Stratified loamy sand to silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	80-100	75-100	50-80	35-60	25-40	5-15

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
154-------------- Gazelle Variant	0-12	Sandy clay loam	SC	A-6	0	100	95-100	70-85	35-50	30-40	10-15
	12-18	Indurated--------	---	---	---	---	---	---	---	---	---
	18-60	Stratified sandy loam to silty clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	80-100	75-95	50-80	35-60	25-40	5-15
155, 156--------- Hilt	0-11	Sandy loam--------	SM	A-4	0-5	95-100	80-100	60-80	35-50	20-25	NP-5
	11-38	Loam, sandy clay loam.	SC, CL	A-6	0-5	95-100	80-100	60-90	35-60	30-40	10-20
	38-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
	47	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
157-------------- Hilt	0-11	Stony sandy loam	SM	A-4	15-30	95-100	80-100	60-70	35-50	20-25	NP-5
	11-38	Loam, sandy clay loam.	SC, CL	A-6	5-15	95-100	80-100	60-90	35-60	30-40	10-20
	38-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
	47	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
158*:											
Hilt--------------	0-11	Stony sandy loam	SM	A-4	15-30	95-100	80-100	60-70	35-50	20-25	NP-5
	11-38	Loam, sandy clay loam.	SC, CL	A-6	5-15	95-100	80-100	60-90	35-60	30-40	10-20
	38-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
	47	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
159, 160--------- Jenny	0-16	Clay--------------	CH, CL	A-7	0	95-100	75-95	75-90	70-85	40-60	20-30
	16-23	Clay, silty clay	CH, CL	A-7	0	95-100	75-95	75-90	70-90	40-60	20-30
	23-60	Stratified clay to loam.	CL, CH	A-6, A-7	0	95-100	75-95	75-90	50-85	35-55	15-30
161-------------- Jenny	0-16	Cobbly clay------	CL, CH	A-7	10-25	80-100	75-100	75-90	70-85	40-60	20-30
	16-23	Clay, silty clay	CL, CH	A-7	0-5	80-100	75-100	75-90	70-85	40-60	20-30
	23-60	Stratified clay to loam.	CL, CH	A-6, A-7	0-5	80-100	75-100	75-90	50-85	35-55	15-30
162-------------- Jilson	0-3	Gravelly loam----	SM-SC, GM-GC	A-4	0-5	60-80	50-75	40-70	35-50	20-30	5-10
	3-14	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-5	60-80	50-75	40-75	35-50	30-40	10-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
163*:											
Jilson----------	0-3	Gravelly loam----	SM-SC, GM-GC	A-4	0-5	60-80	50-75	40-70	35-50	20-30	5-10
	3-14	Gravelly loam, gravelly clay loam.	SC, GC	A-6	0-5	60-80	50-75	40-75	35-50	30-40	10-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Duzel-----------	0-13	Gravelly loam----	SM-SC, GM-GC	A-4	5-10	55-80	50-75	40-70	35-50	20-30	5-10
	13-30	Gravelly loam, gravelly clay loam.	SC, GC	A-6	5-10	55-80	50-75	40-75	35-50	25-40	10-20
	30-38	Very gravelly loam, very gravelly clay loam.	GC	A-2	5-10	30-60	25-50	20-50	15-35	25-40	10-20
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
164*, 165*:											
Kindig----------	0-5	Gravelly loam----	SM, GM	A-4	0-5	55-80	50-75	40-60	35-50	15-25	NP-5
	5-15	Gravelly loam, gravelly sandy loam.	SM, GM	A-2, A-4	0-10	55-80	50-75	35-60	30-50	15-25	NP-5
	15-60	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	0-10	30-60	25-50	15-50	10-35	15-25	NP-5
	60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neuns-----------	0-8	Gravelly loam----	SM, GM	A-4	0-5	55-80	50-75	40-60	35-50	15-25	NP-5
	8-35	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	0-10	30-55	25-50	20-45	10-35	15-25	NP-5
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
166-------------- Kinkel	0-9	Very gravelly loam.	GM	A-1, A-2	5-15	35-55	30-50	25-45	20-35	20-25	NP-5
	9-60	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	5-15	35-55	30-50	25-45	20-35	20-25	NP-5
167, 168--------- Kuck	0-6	Clay loam--------	CL	A-6	0-10	80-100	75-95	70-95	60-80	30-40	10-15
	6-20	Clay loam, silty clay loam, clay.	CL, CH	A-7	0-10	80-100	75-95	70-95	60-90	40-55	15-30
	20-32	Gravelly clay loam.	SC, CL, GC	A-6, A-7	0-10	65-85	55-75	50-70	35-60	35-45	15-20
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
169, 170--------- Lassen	0-9	Clay-------------	CL, CH	A-7	0-5	85-100	75-95	70-90	70-85	40-60	20-30
	9-26	Clay loam, clay	CL, CH	A-7	0-5	85-100	75-95	70-90	70-85	40-60	15-30
	26-28	Gravelly clay loam, gravelly clay.	SC, CL, CH, GC	A-7	0-5	60-85	50-75	45-70	35-65	40-60	15-30
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
171-------------- Lassen	0-9	Cobbly clay------	CL, CH	A-7	15-30	80-95	70-90	65-85	50-80	40-60	20-30
	9-28	Cobbly clay, cobbly clay loam.	CL, CH	A-7	15-30	80-95	70-90	65-85	50-80	40-60	15-30
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
172*:											
Lassen----------	0-9	Clay-------------	CL, CH	A-7	0-5	85-100	75-95	70-90	70-85	40-60	20-30
	9-26	Clay loam, clay	CL, CH	A-7	0-5	85-100	75-95	70-90	70-85	40-60	15-30
	26-28	Gravelly clay loam, gravelly clay.	SC, CL, CH, GC	A-7	0-5	60-85	50-75	45-70	35-65	40-60	15-30
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kuck------------	0-6	Clay loam--------	CL	A-6	0-10	80-100	75-95	70-95	60-80	30-40	10-15
	6-20	Clay loam, silty clay loam, clay.	CL, CH	A-7	0-10	80-100	75-95	70-95	60-90	40-55	15-30
	20-32	Gravelly clay loam.	SC, CL, GC	A-6, A-7	0-10	65-85	55-75	50-70	35-60	35-45	15-20
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
173*:											
Lassen	0-9	Stony clay	CL, CH	A-7	15-30	80-95	70-90	65-85	50-80	40-60	20-30
	9-28	Cobbly clay, cobbly clay loam.	CL, CH	A-7	15-30	80-95	70-90	65-85	50-80	40-60	15-30
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kuck	0-6	Stony clay loam	CL	A-6	10-25	85-95	80-95	70-90	60-80	30-40	10-15
	6-20	Stony clay loam, stony silty clay loam, stony clay.	CL, CH	A-7	10-25	85-95	80-95	70-90	60-85	40-55	15-30
	20-32	Stony clay loam	SC, CL	A-6, A-7	10-30	75-90	60-75	50-70	35-60	35-45	15-20
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
174*:											
Lassen	0-9	Very stony clay	CL, CH	A-7	20-30	80-95	70-90	65-85	50-80	40-60	15-30
	9-28	Cobbly clay, cobbly clay loam.	CL, CH	A-7	15-30	80-95	70-90	65-85	50-80	40-60	15-30
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Kuck	0-6	Very stony clay loam.	CL	A-6	20-30	85-95	80-95	70-90	60-80	30-40	10-15
	6-20	Stony clay loam, stony silty clay loam, stony clay.	CL, CH	A-7	10-25	85-95	80-95	70-90	60-85	40-55	15-30
	20-32	Stony clay loam	SC, CL	A-6, A-7	10-30	75-90	60-75	50-70	35-60	35-45	15-20
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
175*. Lava flows											
176*:											
Lava flows.											
Xerorthents.											
177*:											
Lithic Haploxerolls.											
Rock outcrop.											
178*:											
Lithic Xerorthents.											
Rock outcrop.											
179, 180 Louie	0-12	Loam	CL-ML	A-4	0-5	85-100	75-100	60-95	50-75	20-30	5-10
	12-21	Loam	CL-ML, ML	A-4	0-5	85-100	75-100	60-95	50-80	25-35	5-10
	21-29	Sandy clay loam, clay loam.	SC, CL	A-6	0-5	85-100	75-100	65-95	35-80	30-40	10-15
	29-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Stratified gravelly sand to stony sand.	GP, SP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
181----------- Louie	0-12	Stony loam-------	CL-ML	A-4	15-25	80-100	75-95	60-85	50-75	20-30	5-10
	12-21	Stony loam, cobbly loam.	CL-ML, ML	A-4	15-25	80-100	75-95	60-85	50-75	25-35	5-10
	21-29	Stony sandy clay loam, cobbly sandy clay loam, stony clay loam.	SC, CL	A-6	15-25	80-100	75-95	65-85	35-60	30-40	10-15
	29-32	Indurated--------	---	---	---	---	---	---	---	---	---
	32-60	Stratified gravelly sand to stony sand.	GP, SP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP
182----------- Louie Variant	0-15	Sandy clay loam	SC	A-6	0	95-100	95-100	75-85	35-50	30-40	10-15
	15-26	Sandy clay loam, clay loam.	SC, CL	A-6	0	95-100	95-100	75-95	35-65	30-40	10-20
	26-33	Sandy loam, loam	SM-SC, SM, CL-ML, ML	A-2, A-4	0	95-100	95-100	60-95	30-60	25-35	5-10
	33-60	Cemented---------	---	---	---	---	---	---	---	---	---
183*, 184*: Marpa-----------	0-14	Gravelly loam----	SM, GM	A-4	0-10	55-80	50-75	40-70	35-50	25-35	NP-10
	14-30	Very gravelly clay loam, very gravelly sandy clay loam.	GC	A-2, A-6	5-10	30-55	25-50	20-45	10-40	30-40	10-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kinkel----------	0-9	Very gravelly loam.	GM	A-1, A-2	5-15	35-55	30-50	25-45	20-35	20-25	NP-5
	9-60	Very gravelly loam, very gravelly sandy loam, gravelly loam.	GM	A-1, A-2	5-15	35-55	30-50	25-45	20-35	20-25	NP-5
Boomer----------	0-10	Gravelly loam----	SC, SM-SC	A-4, A-6	0-5	75-85	50-75	40-60	35-50	25-40	5-15
	10-53	Gravelly sandy clay loam, gravelly clay loam.	CL, SC	A-6, A-7	0-5	75-85	50-75	45-70	35-60	30-50	10-25
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
185, 186--------- Mary	0-10	Loam-------------	ML, CL-ML	A-4	0-5	80-100	80-95	60-90	50-65	25-35	5-10
	10-24	Loam, clay loam	CL	A-6	0-5	80-100	80-95	60-90	60-85	30-40	10-20
	24-28	Sandy clay loam	SC	A-6	0-5	80-100	80-95	60-80	35-50	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
187----------- Mary	0-10	Stony loam-------	ML, CL-ML	A-4	5-10	80-100	80-95	60-90	50-65	25-35	5-10
	10-24	Loam, clay loam	CL	A-6	0-5	80-100	80-95	60-90	60-85	30-40	10-20
	24-28	Sandy clay loam	SC	A-6	0-5	80-100	80-95	60-80	35-50	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
188*: Mary-----------	0-10	Stony loam-------	ML, CL-ML	A-4	5-10	80-100	80-95	60-90	50-65	25-35	5-10
	10-24	Loam, clay loam	CL	A-6	0-5	80-100	80-95	60-90	60-85	30-40	10-20
	24-28	Sandy clay loam	SC	A-6	0-5	80-100	80-95	60-80	35-50	30-40	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
189, 190, 191----- Medford	0-18	Clay loam--------	CL	A-6	0-10	90-100	80-100	75-100	55-85	35-40	15-20
	18-60	Silty clay loam, clay loam, clay, silty clay.	CL	A-7	0-10	90-100	80-100	75-100	70-95	40-50	20-25
192, 193--------- Montague	0-4	Clay-------------	CL, CH	A-7	0-5	95-100	95-100	80-100	75-95	45-60	20-30
	4-24	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	95-100	80-100	70-95	40-60	15-30
	24-36	Cemented---------	---	---	---	---	---	---	---	---	---
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
194-------------- Montague	0-4	Cobbly clay------	CL, CH	A-7	20-40	85-100	80-100	70-100	60-95	45-60	20-30
	4-24	Cobbly clay, cobbly clay loam.	CL, CH	A-7	20-40	85-100	80-100	70-100	60-95	40-60	15-30
	24-36	Cemented---------	---	---	---	---	---	---	---	---	---
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
195-------------- Montague Variant	0-12	Clay-------------	CL, CH	A-7	0	100	95-100	95-100	70-95	45-55	20-30
	12-15	Indurated--------	---	---	---	---	---	---	---	---	---
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
196*:											
Neer------------	0-9	Stony sandy loam	SM, GM	A-1, A-2	15-20	60-90	55-75	30-50	20-35	25-35	NP-5
	9-26	Very gravelly sandy loam.	GM, SM	A-1	5-20	30-70	25-50	20-40	10-25	25-35	NP-5
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ponto-----------	0-8	Stony sandy loam	SM, GM	A-4	10-25	65-85	60-80	50-75	35-50	20-30	NP-5
	8-53	Sandy loam, loam	SM	A-4	5-10	80-100	75-95	50-80	35-50	20-30	NP-5
	53-80	Stony sandy loam, stony loam.	SM	A-2, A-4	15-30	75-85	65-80	50-75	30-50	20-30	NP-5
197*:											
Neer------------	0-9	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	60-90	50-75	30-50	20-35	25-35	NP-5
	9-26	Very gravelly sandy loam.	GM, SM	A-1	5-20	30-70	25-50	20-40	10-25	25-35	NP-5
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ponto-----------	0-8	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-53	Sandy loam, loam	SM, ML	A-4	0-5	80-100	75-95	50-80	35-60	20-30	NP-5
	53-80	Stony sandy loam, stony loam.	SM	A-2, A-4	15-30	75-85	65-80	50-75	30-50	20-30	NP-5
198-------------- Odas	0-31	Sandy loam-------	SM	A-2, A-4	0-5	80-100	75-95	50-70	25-50	15-25	NP-5
	31-60	Sandy loam, loam	SM	A-2, A-4	0-5	80-100	75-95	50-80	25-50	15-25	NP-5
199-------------- Oosen	0-12	Loamy sand-------	SM	A-2	0-5	90-100	75-100	50-75	15-30	---	NP
	12-28	Loamy sand, loamy fine sand.	SM	A-2	0-5	90-100	75-100	50-75	15-30	---	NP
	28-75	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0-5	90-100	75-100	40-70	5-15	---	NP
200-------------- Orset	0-13	Sandy loam-------	SM	A-4	0-5	85-100	75-100	40-70	35-50	20-30	NP-5
	13-60	Sandy loam, loam	SM, ML	A-4	0-5	85-100	75-100	40-75	35-60	20-35	NP-10
201, 202, 203---- Pinehurst	0-10	Stony loam-------	SM, ML	A-4	20-30	80-95	75-85	60-75	40-55	25-35	NP-10
	10-48	Gravelly loam, gravelly clay loam.	SC, GC	A-6	5-15	55-80	50-75	50-75	35-50	30-40	10-20
	48-60	Very stony loam, very stony clay loam.	SC, GC	A-6	30-50	55-80	50-75	50-75	35-50	30-40	10-20
	60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
214*:											
Louie	0-12	Stony loam	CL-ML	A-4	15-25	80-100	75-95	60-85	50-75	20-30	5-10
	12-21	Stony loam, cobbly loam.	CL-ML, ML	A-4	15-25	80-100	75-95	60-85	50-75	25-35	5-10
	21-29	Stony sandy clay loam, cobbly sandy clay loam, stony clay loam.	SC, CL	A-6	15-25	80-100	75-95	65-85	35-60	30-40	10-15
	29-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Stratified gravelly sand to stony sand.	GP, SP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP
215*: Rock outcrop.											
Terwilliger	0-6	Stony silty clay loam.	CL	A-6	5-20	85-100	75-90	65-85	60-80	30-40	10-20
	6-30	Silty clay loam, silty clay.	CL, CH	A-7	0-10	80-100	75-100	70-100	65-95	40-55	15-30
	30-34	Gravelly silty clay, gravelly silty clay loam.	CL, CH	A-7	0-10	55-80	50-75	50-75	50-70	40-55	15-30
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
216*. Rock outcrop											
217, 218 Salisbury	0-4	Clay loam	CL	A-6	0-5	80-100	75-100	70-90	60-85	30-40	10-20
	4-24	Clay, clay loam, silty clay.	CL, CH	A-7	0-5	80-100	75-95	70-90	65-90	40-60	15-35
	24-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Stratified sand to stony sand.	GP, SP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP
219, 220 Salisbury	0-4	Gravelly clay loam.	SC, GC	A-6	5-10	60-80	55-75	50-70	35-50	30-40	10-20
	4-24	Gravelly clay, gravelly silty clay, gravelly clay loam.	SC, GC, CH, CL	A-7	5-10	60-80	55-75	50-70	35-60	40-60	15-30
	24-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Stratified sand	GP, SP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP
221 Salisbury	0-4	Cobbly loam	SM-SC, SM, GM-GC, GM	A-4	20-35	65-85	60-80	45-70	35-50	25-35	5-10
	4-24	Gravelly clay, gravelly silty clay, gravelly clay loam.	SC, GC, CH, CL	A-7	5-10	60-80	55-75	50-70	35-60	40-60	15-30
	24-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Stratified sand	SP, GP	A-1	10-60	40-60	30-40	15-25	0-5	---	NP
222, 223 Settlemeyer	0-10	Loam	CL	A-6	0	100	95-100	75-85	60-70	25-35	10-15
	10-66	Stratified clay to fine sandy loam.	CL	A-6	0	100	95-100	75-90	60-80	25-40	10-20
224 Settlemeyer Variant	0-19	Silt loam	ML	A-4	0	90-100	80-100	70-100	60-85	30-35	5-10
	19-68	Silty clay loam, clay loam, clay.	CL	A-7	0	90-100	80-100	70-100	65-95	40-50	15-25
	68-80	Stratified gravelly loam to gravelly clay loam.	SC, GC	A-6	0	55-80	50-75	40-70	35-50	30-40	10-15

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
204, 205--------- Pinehurst Variant	0-12	Very stony loam	SM, GM	A-4	25-35	65-80	60-75	50-65	35-50	25-40	NP-10
	12-26	Very cobbly clay loam.	SC, GC	A-6	30-40	55-80	50-75	50-65	35-50	30-40	10-15
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
206-------------- Pit	0-38	Clay-------------	MH, CH	A-7	0	100	100	95-100	85-95	50-65	20-35
	38-61	Silty clay loam, clay loam.	ML, CL	A-6, A-7	0	100	100	90-100	75-90	30-50	10-20
207*:											
Plutos----------	0-7	Loamy sand-------	SM	A-1, A-2	0-10	80-100	75-95	40-70	15-30	---	NP
	7-23	Loamy sand, sand	SM	A-1, A-2	0-10	80-100	75-95	40-70	10-30	---	NP
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
208-------------- Ponto	0-8	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-53	Sandy loam, loam	SM, ML	A-4	0-5	80-100	75-95	50-80	35-60	20-30	NP-5
	53-80	Stony sandy loam, stony loam.	SM	A-2, A-4	15-30	75-85	65-80	50-75	30-50	20-30	NP-5
209*:											
Ponto-----------	0-8	Sandy loam-------	SM	A-4	0-5	80-100	75-100	50-75	35-50	20-30	NP-5
	8-53	Sandy loam, loam	SM, ML	A-4	0-5	80-100	75-95	50-80	35-60	20-30	NP-5
	53-80	Stony sandy loam, stony loam.	SM	A-2, A-4	15-30	75-85	65-80	50-75	30-50	20-30	NP-5
Neer------------	0-9	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	60-90	50-75	30-50	20-35	25-35	NP-5
	9-26	Very gravelly sandy loam.	GM, SM	A-1	5-20	30-70	25-50	20-40	10-25	25-35	NP-5
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
210, 211--------- Redola	0-13	Loam-------------	CL-ML, ML	A-4	0	100	95-100	75-90	50-75	20-30	NP-10
	13-39	Stratified sandy loam to clay loam.	CL-ML, ML, SM-SC, SM	A-4	0	95-100	80-100	60-95	35-60	20-30	NP-10
	39-60	Stratified gravelly sand to gravelly loam.	SM, SM-SC, GM-GC, GM	A-2, A-1	0	60-80	50-75	25-60	15-35	20-30	NP-10
212*. Riverwash											
213*: Rock outcrop.											
Dubakella-------	0-11	Stony loam-------	SC, SM-SC, CL, CL-ML	A-4, A-6	10-25	85-95	70-85	60-70	40-60	25-40	5-15
	11-36	Very gravelly clay loam, very gravelly clay, very cobbly clay.	GC, SC	A-7	10-30	50-75	35-60	35-60	35-50	40-55	15-30
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
214*: Rock outcrop.											

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
225-------------- Sheld	0-7	Very stony sandy loam.	SM, GM	A-1, A-2	10-25	65-80	60-75	40-60	20-35	15-25	NP-5
	7-19	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	55-80	50-75	40-60	20-35	15-25	NP-5
	19-33	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-20	35-60	30-50	25-45	15-30	15-25	NP-5
	33-46	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	15-20	35-60	30-50	25-45	15-35	15-25	NP-5
	46	Weathered bedrock	---	---	---	---	---	---	---	---	---
226*, 227*: Sheld-----------	0-7	Stony sandy loam	SM, GM	A-1, A-2	5-15	65-80	60-75	40-60	20-35	15-25	NP-5
	7-19	Gravelly sandy loam.	SM, GM	A-1, A-2	5-15	55-80	50-75	40-60	20-35	15-25	NP-5
	19-33	Very gravelly sandy loam, very gravelly loam.	GM	A-1, A-2	10-20	35-60	30-50	25-45	15-30	15-25	NP-5
	33-46	Very gravelly loam, very gravelly sandy loam.	GM	A-1, A-2	15-20	35-60	30-50	25-45	15-35	15-25	NP-5
	46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Iller-----------	0-13	Stony sandy loam	SM	A-2, A-4	10-20	80-95	75-90	40-70	25-50	---	NP
	13-28	Sandy loam-------	SM	A-2, A-4	0-10	80-95	75-90	40-70	25-50	---	NP
	28-37	Very stony sandy loam.	SM	A-2, A-4	35-50	80-95	75-90	40-70	25-50	25-35	NP-5
	37-65	Extremely stony sandy clay loam, extremely stony loam.	SM	A-4	50-75	80-95	75-90	55-80	35-50	30-40	5-10
228-------------- Snell	0-4	Very stony loam	ML, GM, SM	A-4, A-6	15-30	65-85	60-80	50-70	40-60	30-40	5-15
	4-21	Very cobbly clay, very cobbly clay loam.	GC, SC	A-7	30-40	65-80	50-70	40-60	35-50	40-50	20-25
	21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
229, 230, 231---- Stoner	0-12	Gravelly sandy loam.	SM, GM	A-2	0-5	55-80	50-75	35-60	25-35	20-25	NP-5
	12-36	Gravelly sandy loam, gravelly loam.	SM, GM	A-2, A-4	0-5	55-80	50-75	35-65	25-50	20-25	NP-5
	36-60	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-5	30-55	25-50	20-50	15-30	20-30	NP-10
232, 233, 234---- Terwilliger	0-6	Silty clay loam	CL	A-6	0-5	80-100	75-100	70-100	60-85	30-40	10-20
	6-30	Silty clay loam, silty clay.	CL, CH	A-7	0-5	80-100	75-100	70-100	65-95	40-55	15-30
	30-34	Gravelly silty clay, gravelly silty clay loam.	CL, CH, GC	A-7	0-5	55-80	50-75	45-75	40-70	40-55	15-30
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
235-------------- Terwilliger	0-6	Stony silty clay loam.	CL	A-6	5-20	85-100	75-90	65-85	60-80	30-40	10-20
	6-30	Silty clay loam, silty clay.	CL, CH	A-7	0-10	80-100	75-100	70-100	65-95	40-55	15-30
	30-34	Gravelly silty clay, gravelly silty clay loam.	CL, CH	A-7	0-10	55-80	50-75	50-75	50-70	40-55	15-30
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
236--------------- Uhlig Variant	0-14	Stony loam-------	SM, ML	A-4	20-35	80-95	75-90	60-80	35-60	20-25	NP-5
	14-42	Stony loam, stony sandy loam.	SM, ML	A-4	20-35	80-95	75-90	50-80	35-60	20-25	NP-5
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
237*: Weitchpec Variant---------	0-4	Gravelly loam-----	GM, SM, GM-GC, SM-SC	A-4	10-15	55-80	50-75	40-70	35-50	25-35	5-10
	4-8	Gravelly clay loam.	GC, SC	A-6	10-15	55-80	50-75	50-75	35-50	30-40	10-20
	8-16	Very gravelly clay loam.	GC	A-2, A-6	10-25	30-55	25-50	20-50	15-40	30-40	10-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
238*. Xerofluvents											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
101, 102--------- Asta	0-13	10-15	2.0-6.0	0.09-0.12	4.5-6.5	<2	Low--------	0.20	5	---	1-2
	13-60	18-25	0.6-2.0	0.21-0.26	4.5-5.5	<2	Low--------	0.28			
	60-71	5-15	0.6-2.0	0.21-0.26	4.5-5.5	<2	Low--------	0.28			
103-------------- Asta	0-13	10-15	2.0-6.0	0.09-0.11	4.5-6.5	<2	Low--------	0.20	5	---	1-2
	13-60	18-25	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low--------	0.24			
	60-71	5-15	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low--------	0.24			
104, 105--------- Atter	0-18	5-10	6.0-20	0.04-0.08	5.6-7.3	<2	Low--------	0.15	5	---	<1
	18-60	0-5	>20	0.03-0.05	5.6-7.3	<2	Low--------	0.10			
106-------------- Atter	0-23	0-5	>20	0.02-0.03	6.1-6.5	<2	Low--------	0.15	5	---	<1
	23-60	0-5	>20	0.02-0.03	6.1-6.5	<2	Low--------	0.15			
107*, 108*: Avis-------------	0-13	0-5	2.0-6.0	0.04-0.07	5.6-7.3	<2	Low--------	0.10	5	---	<1
	13-72	0-5	6.0-20	0.03-0.05	5.6-6.5	<2	Low--------	0.10			
Oosen------------	0-12	0-5	6.0-20	0.06-0.10	5.6-7.3	<2	Low--------	0.15	5	---	2-6
	12-28	0-5	6.0-20	0.06-0.10	5.6-7.3	<2	Low--------	0.15			
	28-75	0-5	6.0-20	0.06-0.08	5.6-7.3	<2	Low--------	0.10			
109*: Avis-------------	0-13	0-5	2.0-6.0	0.04-0.07	5.6-7.3	<2	Low--------	0.10	5	---	<1
	13-75	0-5	6.0-20	0.03-0.05	5.6-6.5	<2	Low--------	0.10			
Lava flows.											
110-------------- Bogus	0-3	25-27	0.2-0.6	0.15-0.17	5.6-6.5	<2	Moderate	0.24	5	---	1-4
	3-11	27-35	0.2-0.6	0.16-0.18	5.6-6.5	<2	Moderate	0.28			
	11-20	27-35	0.2-0.6	0.15-0.17	5.6-6.5	<2	Moderate	0.28			
	20-53	35-60	0.06-0.2	0.12-0.15	4.5-6.0	<2	High-------	0.28			
	53-62	27-40	0.2-0.6	0.15-0.17	4.5-6.0	<2	Moderate	0.28			
	62	---	---	---	---	---	-----------	----			
111-------------- Bogus	0-3	25-27	0.2-0.6	0.15-0.17	5.6-6.5	<2	Moderate	0.24	5	---	1-4
	3-11	27-35	0.2-0.6	0.16-0.18	5.6-6.5	<2	Moderate	0.28			
	11-20	27-35	0.2-0.6	0.15-0.17	5.6-6.5	<2	Moderate	0.28			
	20-53	35-60	0.06-0.2	0.12-0.15	4.5-6.0	<2	High-------	0.28			
	53-62	27-40	0.2-0.6	0.15-0.17	4.5-6.0	<2	Moderate	0.28			
112-------------- Bonnet	0-14	10-18	2.0-6.0	0.13-0.15	6.1-8.4	<2	Low--------	0.32	5	---	1-2
	14-46	10-18	2.0-6.0	0.04-0.08	7.9-9.0	<2	Low--------	0.24			
	46-61	5-15	6.0-20	0.01-0.02	7.9-9.0	<2	Low--------	0.20			
113, 114--------- Bonnet	0-14	10-18	2.0-6.0	0.06-0.11	6.1-8.4	<2	Low--------	0.28	5	---	1-2
	14-46	10-18	2.0-6.0	0.04-0.08	7.9-9.0	<2	Low--------	0.24			
	46-61	5-15	6.0-20	0.01-0.02	7.9-9.0	<2	Low--------	0.20			
115-------------- Boomer	0-10	18-27	0.6-2.0	0.13-0.16	5.6-7.3	<2	Low--------	0.32	3	---	1-3
	10-53	25-35	0.2-0.6	0.15-0.19	5.1-6.5	<2	Moderate	0.28			
	53	---	---	---	---	---	-----------	----			
116*: Boomer----------	0-10	18-27	0.6-2.0	0.13-0.16	5.6-7.3	<2	Low--------	0.32	3	---	1-3
	10-53	25-35	0.2-0.6	0.15-0.19	5.1-6.5	<2	Moderate	0.28			
	53	---	---	---	---	---	-----------	----			
Neuns-----------	0-8	6-17	0.6-2.0	0.09-0.13	5.1-6.5	<2	Low--------	0.24	2	---	<1
	8-35	8-18	0.6-2.0	0.05-0.08	5.1-6.5	<2	Low--------	0.20			
	35	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
117----------------- Boomer Variant	0-25	5-18	2.0-6.0	0.08-0.12	5.1-6.5	<2	Low--------	0.24	5	---	1-3
	25-36	20-25	0.6-2.0	0.14-0.16	5.1-6.5	<2	Moderate	0.28			
	36-50	18-25	0.6-2.0	0.14-0.16	5.1-6.5	<2	Low--------	0.32			
	50-70	15-20	0.6-2.0	0.08-0.12	5.1-6.5	<2	Low--------	0.17			
	70	---	---	---	---	---	-----------	----			
118----------------- Boomer Variant	0-25	5-18	2.0-6.0	0.05-0.09	5.1-6.5	<2	Low--------	0.17	5	---	1-3
	25-36	20-25	0.6-2.0	0.09-0.12	5.1-6.5	<2	Moderate	0.24			
	36-50	18-25	0.6-2.0	0.09-0.12	5.1-6.0	<2	Low--------	0.32			
	50-70	15-20	0.6-2.0	0.05-0.08	5.1-6.0	<2	Low--------	0.17			
	70	---	---	---	---	---	-----------	----			
119*, 120*, 121*:											
Chaix------------	0-4	5-15	2.0-6.0	0.06-0.09	5.6-6.5	<2	Low--------	0.20	2	---	2-6
	4-34	5-15	2.0-6.0	0.06-0.09	5.1-6.0	<2	Low--------	0.20			
	34	---	---	---	---	---	-----------	----			
Chawanakee-------	0-16	5-15	2.0-6.0	0.06-0.09	5.1-6.5	<2	Low--------	0.20	1	---	<1
	16	---	---	---	---	---	-----------	----			
122----------------- Copsey	0-18	40-60	0.06-0.2	0.11-0.15	6.1-7.3	<2	High-------	0.20	5	---	2-6
	18-60	40-60	<0.06	0.10-0.14	6.1-7.8	<2	High-------	0.17			
123----------------- Copsey	0-18	40-60	0.06-0.2	0.10-0.14	6.1-7.3	<2	High-------	0.17	5	---	2-6
	18-60	40-60	<0.06	0.10-0.14	6.1-7.8	<2	High-------	0.17			
124----------------- Copsey	0-18	40-60	0.06-0.2	0.09-0.14	6.1-7.3	<2	High-------	0.17	5	---	1-4
	18-60	40-60	<0.06	0.09-0.14	6.1-7.8	<2	High-------	0.17			
125, 126---------- Deetz	0-7	0-5	6.0-20	0.05-0.09	4.5-6.0	<2	Low--------	0.15	2	---	1-5
	7-38	0-2	6.0-20	0.04-0.06	4.5-6.0	<2	Low--------	0.10			
	38-65	0-2	6.0-20	0.03-0.04	4.5-6.0	<2	Low--------	0.10			
127, 128---------- Deetz	0-7	0-5	6.0-20	0.04-0.07	4.5-6.0	<2	Low--------	0.15	2	---	1-5
	7-38	0-2	6.0-20	0.04-0.05	4.5-6.0	<2	Low--------	0.10			
	38-65	0-2	6.0-20	0.02-0.03	4.5-6.0	<2	Low--------	0.10			
129----------------- Delaney	0-9	0-5	6.0-20	0.05-0.07	5.6-7.3	<2	Low--------	0.15	5	2	<1
	9-68	0-5	6.0-20	0.05-0.07	5.6-7.3	<2	Low--------	0.15			
130----------------- Delaney	0-9	0-5	6.0-20	0.04-0.06	5.6-7.3	<2	Low--------	0.10	5	2	<1
	9-44	0-5	6.0-20	0.04-0.06	5.6-7.3	<2	Low--------	0.10			
	44-68	0-5	6.0-20	0.04-0.05	5.6-7.3	<2	Low--------	0.10			
131----------------- Delaney	0-9	0-5	6.0-20	0.04-0.05	5.6-7.3	<2	Low--------	0.10	3	2	<1
	9-45	0-5	6.0-20	0.04-0.05	5.6-7.3	<2	Low--------	0.10			
	45	---	---	---	---	---	-----------	----			
132, 133---------- Delaney	0-9	3-10	6.0-20	0.07-0.09	5.6-7.3	<2	Low--------	0.15	5	3	<1
	9-68	0-5	6.0-20	0.05-0.07	5.6-7.3	<2	Low--------	0.15			
134----------------- Delaney Variant	0-7	0-5	0.2-0.6	0.15-0.17	6.1-7.3	<2	Low--------	0.64	3	5	<1
	7-14	0-5	2.0-6.0	0.07-0.10	6.1-7.3	<2	Low--------	0.28			
	14-22	0-5	0.2-0.6	0.15-0.17	6.1-7.3	<2	Low--------	0.64			
	22-34	0-5	2.0-6.0	0.05-0.08	6.1-7.3	<2	Low--------	0.28			
	34-53	0-5	0.6-2.0	0.08-0.10	6.6-7.8	<2	Low--------	0.32			
	53-60	0-5	6.0-20	0.04-0.06	6.6-7.8	<2	Low--------	0.15			
135*:											
Deven------------	0-5	20-27	0.6-2.0	0.13-0.16	6.1-7.8	<2	Low--------	0.32	1	---	1-3
	5-17	35-50	0.06-0.2	0.13-0.17	6.1-7.8	<2	High-------	0.28			
	17	---	---	---	---	---	-----------	----			
Rubble land.											
136, 137---------- Diyou	0-11	18-25	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low--------	0.32	5	---	2-5
	11-60	18-25	0.2-0.6	0.15-0.17	6.6-7.8	<2	Moderate	0.32			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
138------------- Diyou	0-11	10-20	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low--------	0.37	5	---	2-5
	11-40	18-25	0.2-0.6	0.15-0.17	6.6-7.8	<2	Moderate	0.32			
	40-62	---	6.0-20.0	0.26-0.30	6.6-7.8	<2	Low--------	----			
139, 140--------- Dotta	0-15	10-25	0.6-2.0	0.13-0.16	6.1-6.5	<2	Low--------	0.32	5	---	1-3
	15-62	20-30	0.2-0.6	0.14-0.17	5.6-6.5	<2	Moderate	0.24			
141, 142--------- Dotta	0-15	10-25	0.6-2.0	0.07-0.12	6.1-6.5	<2	Low--------	0.28	5	---	1-3
	15-62	20-30	0.2-0.6	0.08-0.13	6.1-6.5	<2	Moderate	0.20			
143*, 144*:											
Dubakella-------	0-11	20-35	0.2-0.6	0.10-0.15	5.6-7.3	<2	Moderate	0.28	2	---	4-10
	11-36	35-50	0.06-0.2	0.08-0.10	6.1-7.3	<2	Moderate	0.24			
	36	---	---	---	---	---	-----------	----			
Ipish-----------	0-2	18-27	0.2-0.6	0.12-0.13	6.1-7.8	<2	Low--------	0.32	5	---	1-4
	2-44	27-35	0.2-0.6	0.12-0.13	6.1-7.8	<2	Moderate	0.24			
	44-65	27-45	0.2-0.6	0.07-0.11	7.4-8.4	<2	Moderate	0.20			
	65	---	---	---	---	---	-----------	----			
145*. Dumps											
146, 147--------- Duzel	0-13	10-18	0.6-2.0	0.09-0.13	5.6-7.3	<2	Low--------	0.32	2	---	1-2
	13-30	18-35	0.2-0.6	0.09-0.15	5.6-7.8	<2	Moderate	0.32			
	30-38	18-35	0.2-0.6	0.06-0.11	5.6-7.8	<2	Moderate	0.24			
	38	---	---	---	---	---	-----------	----			
148*:											
Duzel-----------	0-13	10-18	0.6-2.0	0.09-0.13	5.6-7.3	<2	Low--------	0.32	2	---	1-2
	13-30	18-35	0.2-0.6	0.09-0.15	5.6-7.8	<2	Moderate	0.32			
	30-38	18-35	0.2-0.6	0.06-0.11	5.6-7.8	<2	Moderate	0.24			
	38	---	---	---	---	---	-----------	----			
Jilson----------	0-3	12-18	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low--------	0.32	1	---	1-2
	3-14	18-35	0.6-2.0	0.11-0.14	6.1-7.8	<2	Low--------	0.24			
	14	---	---	---	---	---	-----------	----			
Facey-----------	0-10	15-20	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low--------	0.37	4	---	1-2
	10-59	18-35	0.2-0.6	0.12-0.16	5.6-7.3	<2	Moderate	0.32			
	59	---	---	---	---	---	-----------	----			
149, 150--------- Esro	0-32	18-25	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low--------	0.37	5	---	2-6
	32-46	18-30	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43			
	46-79	15-25	0.2-0.6	0.11-0.17	6.6-7.8	<2	Moderate	0.24			
151------------- Etsel	0-7	12-18	0.6-2.0	0.04-0.10	5.6-6.5	<2	Low--------	0.28	1	---	1-2
	7	---	---	---	---	---	-----------	----			
152------------- Facey	0-10	15-20	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low--------	0.37	4	---	1-2
	10-59	18-35	0.2-0.6	0.12-0.16	5.6-7.3	<2	Moderate	0.32			
	59	---	---	---	---	---	-----------	----			
153------------- Gazelle	0-11	8-18	2.0-6.0	0.14-0.17	>7.8	4-6	Low--------	0.49	2	---	1-2
	11-25	10-30	2.0-6.0	0.14-0.17	>7.8	4-6	Low--------	0.49			
	25-38	---		---	---	<2	-----------	----			
	38-60	10-30	0.2-0.6	0.11-0.16	>7.8	4-6	Low--------	0.37			
154------------- Gazelle Variant	0-12	20-30	0.2-0.6	0.15-0.18	7.9-9.0	6-8	Moderate	0.28	1	---	1-2
	12-18	---	---	---	---	<2	-----------	----			
	18-60	10-30	0.2-0.6	0.11-0.16	7.9-9.0	6-8	Moderate	0.37			
155, 156--------- Hilt	0-11	10-20	2.0-6.0	0.08-0.11	5.6-7.3	<2	Low--------	0.28	2	---	<1
	11-38	20-35	0.2-0.6	0.13-0.17	5.6-7.3	<2	Moderate	0.32			
	38-47	---	---	---	---	---	-----------	----			
	47	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
157----------------- Hilt	0-11	10-20	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low--------	0.24	2	---	<1
	11-38	20-35	0.2-0.6	0.12-0.16	5.6-7.3	<2	Moderate	0.32			
	38-47	---	---	---	---	---	-----------	----			
	47	---	---	---	---	---	-----------	----			
158*:											
Hilt------------	0-11	10-20	2.0-6.0	0.06-0.08	5.6-7.3	<2	Low--------	0.24	2	---	<1
	11-38	20-35	0.2-0.6	0.12-0.16	5.6-7.3	<2	Moderate	0.32			
	38-47	---	---	---	---	---	-----------	----			
	47	---	---	---	---	---	-----------	----			
Rock outcrop.											
159, 160--------- Jenny	0-16	40-50	0.06-0.2	0.13-0.16	6.1-7.8	<2	High------	0.28	5	---	<2
	16-23	40-50	0.06-0.2	0.13-0.16	6.6-8.4	<2	High------	0.32			
	23-60	25-50	0.06-0.2	0.13-0.17	7.9-9.0	<2	High------	0.32			
161-------------- Jenny	0-16	40-50	0.06-0.2	0.10-0.15	6.1-7.8	<2	High------	0.24	5	---	<2
	16-23	40-50	0.06-0.2	0.13-0.16	6.6-8.4	<2	High------	0.32			
	23-60	25-50	0.06-0.2	0.13-0.17	7.9-9.0	<2	High------	0.32			
162-------------- Jilson	0-3	12-18	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low--------	0.32	1	---	1-2
	3-14	18-35	0.6-2.0	0.11-0.14	6.1-7.8	<2	Low--------	0.24			
	14	---	---	---	---	---	-----------	----			
163*:											
Jilson----------	0-3	12-18	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low--------	0.32	1	---	1-2
	3-14	18-35	0.6-2.0	0.11-0.14	6.1-7.8	<2	Low--------	0.24			
	14	---	---	---	---	---	-----------	----			
Duzel-----------	0-13	10-18	0.6-2.0	0.09-0.13	5.6-7.3	<2	Low--------	0.32	2	---	1-2
	13-30	18-35	0.2-0.6	0.09-0.15	5.6-7.8	<2	Moderate	0.32			
	30-38	18-35	0.2-0.6	0.06-0.11	5.6-7.8	<2	Moderate	0.24			
	38	---	---	---	---	---	-----------	----			
164*, 165*:											
Kindig----------	0-5	5-16	0.6-2.0	0.08-0.12	5.6-7.3	<2	Low--------	0.32	3	---	<1
	5-15	6-18	0.6-2.0	0.06-0.12	5.6-6.5	<2	Low--------	0.32			
	15-60	6-18	0.6-2.0	0.05-0.09	5.6-6.5	<2	Low--------	0.28			
	60	---	---	---	---	---	-----------	----			
Neuns-----------	0-8	6-17	0.6-2.0	0.09-0.13	5.1-6.5	<2	Low--------	0.24	2	---	<1
	8-35	7-19	0.6-2.0	0.05-0.08	5.1-6.5	<2	Low--------	0.20			
	35	---	---	---	---	---	-----------	----			
166-------------- Kinkel	0-9	10-15	0.6-2.0	0.06-0.10	5.1-6.5	<2	Low--------	0.24	3	---	3-10
	9-60	13-20	0.6-2.0	0.06-0.10	5.1-6.0	<2	Low--------	0.24			
167, 168--------- Kuck	0-6	27-35	0.2-0.6	0.15-0.17	6.1-7.3	<2	Moderate	0.32	2	---	1-2
	6-20	35-50	0.06-0.2	0.13-0.16	6.6-7.8	<2	High------	0.32			
	20-32	30-40	0.06-0.2	0.12-0.14	6.6-7.8	<2	Moderate	0.28			
	32	---	---	---	---	---	-----------	----			
169, 170--------- Lassen	0-9	40-60	0.06-0.2	0.13-0.16	6.6-7.8	<2	High------	0.28	2	---	1-2
	9-26	40-60	0.06-0.2	0.13-0.16	6.6-8.4	<2	High------	0.28			
	26-28	35-60	0.06-0.2	0.12-0.15	6.6-8.4	<2	High------	0.24			
	28	---	---	---	---	---	-----------	----			
171-------------- Lassen	0-9	40-60	0.06-0.2	0.09-0.13	6.6-7.8	<2	High------	0.24	2	---	1-2
	9-28	35-60	0.06-0.2	0.09-0.13	6.6-8.4	<2	High------	0.24			
	28	---	---	---	---	---	-----------	----			
172*:											
Lassen----------	0-9	40-60	0.06-0.2	0.13-0.16	6.6-7.8	<2	High------	0.28	2	---	1-2
	9-26	40-60	0.06-0.2	0.13-0.16	6.6-8.4	<2	High------	0.28			
	26-28	35-60	0.06-0.2	0.12-0.15	6.6-8.4	<2	High------	0.24			
	28	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
172*:											
Kuck	0-6	27-35	0.2-0.6	0.15-0.17	6.1-7.3	<2	Moderate	0.32	2	---	1-2
	6-20	35-50	0.06-0.2	0.13-0.16	6.6-7.8	<2	High	0.32			
	20-32	30-40	0.06-0.2	0.12-0.14	6.6-7.8	<2	Moderate	0.28			
	32	---	---	---	---	---	----------	----			
173*:											
Lassen	0-9	40-60	0.06-0.2	0.09-0.13	6.6-7.8	<2	High	0.24	2	---	1-2
	9-28	35-60	0.06-0.2	0.09-0.13	6.6-8.4	<2	High	0.24			
	28	---	---	---	---	---	----------	----			
Kuck	0-6	27-35	0.2-0.6	0.13-0.15	6.1-7.3	<2	Moderate	0.28	2	---	1-2
	6-20	35-50	0.06-0.2	0.12-0.15	6.6-7.8	<2	High	0.28			
	20-32	30-40	0.06-0.2	0.12-0.14	6.6-7.8	<2	Moderate	0.24			
	32	---	---	---	---	---	----------	----			
174*:											
Lassen	0-9	35-60	0.06-0.2	0.09-0.13	6.6-7.8	<2	High	0.24	2	---	1-2
	9-28	35-60	0.06-0.2	0.09-0.13	6.6-8.4	<2	High	0.24			
	28	---	---	---	---	---	----------	----			
Rock outcrop.											
Kuck	0-6	27-35	0.2-0.6	0.12-0.14	6.1-7.3	<2	Moderate	0.28	2	---	1-2
	6-20	35-50	0.06-0.2	0.12-0.15	6.6-7.8	<2	High	0.28			
	20-32	30-40	0.06-0.2	0.12-0.14	6.6-7.8	<2	Moderate	0.24			
	32	---	---	---	---	---	----------	----			
175*. Lava flows											
176*:											
Lava flows.											
Xerorthents.											
177*:											
Lithic Haploxerolls.											
Rock outcrop.											
178*:											
Lithic Xerorthents.											
Rock outcrop.											
179, 180 Louie	0-12	10-20	0.6-2.0	0.13-0.16	6.1-7.8	<2	Low	0.32	2	---	<1
	12-21	20-27	0.2-0.6	0.13-0.16	6.6-8.4	<2	Low	0.32			
	21-29	20-30	0.2-0.6	0.15-0.18	6.6-8.4	<2	Moderate	0.28			
	29-32	---	---	---	---	<2	----------	----			
	32-60	0-5	>20	0.02-0.04	6.6-8.4	<2	Low	0.15			
181 Louie	0-12	10-20	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low	0.28	2	---	<1
	12-21	20-27	0.2-0.6	0.11-0.14	6.6-8.4	<2	Low	0.28			
	21-29	20-30	0.2-0.6	0.13-0.14	6.6-8.4	<2	Moderate	0.24			
	29-32	---	---	---	---	---	----------	----			
	32-60	3-10	6.0-20.0	0.02-0.04	6.6-8.4	<2	Low	0.17			
182 Louie Variant	0-15	20-27	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.28	2	---	<1
	15-26	25-35	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.32			
	26-33	15-25	0.6-6.0	0.10-0.15	7.4-8.4	<2	Low	0.37			
	33-60	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
183*, 184*:											
Marpa-----------	0-14	15-25	0.6-2.0	0.10-0.12	5.6-6.5	<2	Low--------	0.32	2	---	<1
	14-30	27-35	0.6-2.0	0.06-0.10	5.1-6.0	<2	Low--------	0.24			
	30	---	---	---	---	---	-----------	----			
Kinkel----------	0-9	10-15	0.6-2.0	0.06-0.10	5.1-6.5	<2	Low--------	0.24	3	---	3-10
	9-60	13-20	0.6-2.0	0.06-0.10	5.1-6.0	<2	Low--------	0.24			
Boomer----------	0-10	18-27	0.6-2.0	0.11-0.15	5.6-7.3	<2	Low--------	0.28	3	---	1-3
	10-53	25-35	0.2-0.6	0.12-0.15	5.1-6.5	<2	Moderate	0.24			
	53	---	---	---	---	---	-----------	----			
185, 186--------- Mary	0-10	12-25	0.6-2.0	0.13-0.16	6.1-7.3	<2	Low--------	0.37	1	---	<1
	10-24	20-35	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.28			
	24-28	20-30	0.2-0.6	0.15-0.18	6.6-7.8	<2	Moderate	0.28			
	28	---	---	---	---	---	-----------	----			
187-------------- Mary	0-10	12-25	0.6-2.0	0.12-0.15	6.1-7.3	<2	Low--------	0.28	1	---	<1
	10-24	20-35	0.2-0.6	0.14-0.17	6.6-7.8	<2	Moderate	0.28			
	24-28	20-30	0.2-0.6	0.14-0.17	6.6-7.8	<2	Moderate	0.28			
	28	---	---	---	---	---	-----------	----			
188*:											
Mary------------	0-10	12-25	0.6-2.0	0.12-0.15	6.1-7.3	<2	Low--------	0.28	1	---	<1
	10-24	20-35	0.2-0.6	0.14-0.17	6.6-7.8	<2	Moderate	0.28			
	24-28	20-30	0.2-0.6	0.14-0.17	6.6-7.8	<2	Moderate	0.28			
	28	---	---	---	---	---	-----------	----			
Rock outcrop.											
189, 190, 191---- Medford	0-18	27-35	0.2-0.6	0.16-0.18	5.6-7.3	<2	Moderate	0.32	5	---	1-4
	18-60	35-45	0.2-0.6	0.14-0.17	5.6-7.3	<2	High------	0.28			
192, 193--------- Montague	0-4	40-50	0.06-0.2	0.12-0.16	6.1-7.3	<2	High------	0.20	2	---	1-2
	4-24	35-50	0.06-0.2	0.12-0.16	6.1-7.3	<2	High------	0.20			
	24-36	---	---	---	---	---	-----------	----			
	36	---	---	---	---	---	-----------	----			
194-------------- Montague	0-4	40-50	0.06-0.2	0.08-0.11	6.1-7.3	<2	High------	0.20	2	---	1-2
	4-24	35-50	0.06-0.2	0.08-0.11	6.1-7.3	<2	High------	0.20			
	24-36	---	---	---	---	---	-----------	----			
	36	---	---	---	---	---	-----------	----			
195-------------- Montague Variant	0-12	40-50	0.06-0.2	0.13-0.16	6.1-7.3	<2	High------	0.20	1	---	1-2
	12-15	---	---	---	---	---	-----------	----			
	15	---	---	---	---	---	-----------	----			
196*:											
Neer------------	0-9	3-15	6.0-20.0	0.08-0.11	5.1-6.5	<2	Low--------	0.17	2	---	4-15
	9-26	4-17	6.0-20.0	0.07-0.10	5.1-6.5	<2	Low--------	0.10			
	26	---	---	---	---	---	-----------	----			
Ponto-----------	0-8	6-15	2.0-6.0	0.08-0.10	5.1-6.0	<2	Low--------	0.17	5	---	1-5
	8-53	8-18	0.6-2.0	0.10-0.16	4.5-6.0	<2	Low--------	0.20			
	53-80	10-18	0.6-2.0	0.08-0.10	4.5-6.0	<2	Low--------	0.17			
197*:											
Neer------------	0-9	3-15	6.0-20.0	0.09-0.12	5.1-6.5	<2	Low--------	0.17	2	---	4-15
	9-26	4-17	6.0-20.0	0.07-0.10	5.1-6.5	<2	Low--------	0.10			
	26	---	---	---	---	---	-----------	----			
Ponto-----------	0-8	6-15	2.0-6.0	0.10-0.13	5.1-6.0	<2	Low--------	0.17	5	---	1-5
	8-53	8-18	0.6-2.0	0.10-0.16	4.5-6.0	<2	Low--------	0.20			
	53-80	10-18	0.6-2.0	0.08-0.10	4.5-6.0	<2	Low--------	0.17			
198-------------- Odas	0-31	6-18	2.0-6.0	0.09-0.12	5.1-6.0	<2	Low--------	0.20	5	---	4-6
	31-53	6-18	2.0-6.0	0.09-0.15	5.1-6.0	<2	Low--------	0.28			
	53-60	6-18	2.0-6.0	0.08-0.12	5.1-6.0	<2	Low--------	0.24			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
199------------- Oosen	0-12	0-5	6.0-20	0.06-0.10	5.6-7.3	<2	Low--------	0.15	5	---	2-6
	12-28	0-5	6.0-20	0.06-0.10	5.6-7.3	<2	Low--------	0.15			
	28-75	0-5	6.0-20	0.06-0.08	5.6-7.3	<2	Low--------	0.10			
200------------- Orset	0-13	10-18	2.0-6.0	0.09-0.11	5.6-6.5	<2	Low--------	0.24	5	---	<1
	13-62	10-18	0.2-0.6	0.09-0.16	5.6-6.5	<2	Low--------	0.32			
201, 202, 203---- Pinehurst	0-10	15-25	0.6-2.0	0.10-0.13	5.6-6.5	<2	Low--------	0.20	3	---	1-4
	10-48	20-35	0.2-0.6	0.08-0.14	5.1-6.5	<2	Low--------	0.28			
	48-60	20-30	0.2-0.6	0.07-0.11	5.1-6.5	<2	Low--------	0.28			
	60	---	---	---	---	---	-----------	----			
204, 205--------- Pinehurst Variant	0-12	16-27	0.6-2.0	0.08-0.12	6.1-7.8	<2	Low--------	0.24	2	---	1-2
	12-26	27-35	0.2-0.6	0.08-0.13	6.1-7.8	<2	Moderate	0.24			
	26	---	---	---	---	---	-----------	----			
206------------- Pit	0-38	40-60	0.06-0.2	0.14-0.16	6.6-7.8	<2	High-------	0.32	5	---	1-4
	38-61	30-40	0.06-0.2	0.16-0.19	7.4-8.4	<4	Moderate	0.37			
207*:											
Plutos----------	0-7	3-8	6.0-20	0.05-0.07	5.6-7.3	<2	Low--------	0.17	2	2	<1
	7-23	3-8	6.0-20	0.05-0.07	5.6-7.3	<2	Low--------	0.15			
	23	---	---	---	---	---	-----------	----			
Rock outcrop.											
208------------- Ponto	0-8	6-15	2.0-6.0	0.10-0.13	5.1-6.0	<2	Low--------	0.17	5	---	1-5
	8-53	8-18	0.6-2.0	0.10-0.16	4.5-6.0	<2	Low--------	0.20			
	53-80	10-18	0.6-2.0	0.08-0.10	4.5-6.0	<2	Low--------	0.17			
209*:											
Ponto-----------	0-8	6-15	2.0-6.0	0.10-0.13	5.1-6.0	<2	Low--------	0.17	5	---	1-5
	8-53	8-18	0.6-2.0	0.10-0.16	4.5-6.0	<2	Low--------	0.20			
	53-80	10-18	0.6-2.0	0.08-0.10	4.5-6.0	<2	Low--------	0.17			
Neer------------	0-9	3-15	6.0-20.0	0.09-0.12	5.1-6.5	<2	Low--------	0.17	2	---	4-15
	9-26	4-17	6.0-20.0	0.07-0.10	5.1-6.5	<2	Low--------	0.10			
	26	---	---	---	---	---	-----------	----			
210, 211--------- Redola	0-13	7-18	0.6-2.0	0.14-0.16	7.4-8.4	<2	Low--------	0.32	5	4L	1-2
	13-39	7-18	0.6-2.0	0.12-0.17	7.4-9.0	<2	Low--------	0.28			
	39-60	2-18	0.6-2.0	0.04-0.12	7.4-9.0	<2	Low--------	0.28			
212*. Riverwash											
213*: Rock outcrop.											
Dubakella--------	0-11	20-35	0.2-0.6	0.10-0.15	5.6-7.3	<2	Moderate	0.28	2	---	4-10
	11-36	35-50	0.06-0.2	0.08-0.10	6.1-7.8	<2	Moderate	0.24			
	36	---	---	---	---	---	-----------	----			
214*: Rock outcrop.											
Louie------------	0-12	10-20	0.6-2.0	0.11-0.13	6.1-7.8	<2	Low--------	0.28	2	---	<1
	12-21	20-27	0.2-0.6	0.11-0.14	6.6-8.4	<2	Low--------	0.28			
	21-29	20-30	0.2-0.6	0.13-0.14	6.6-8.4	<2	Moderate	0.24			
	29-32	---		---	---	---	-----------	----			
	32-60	3-10	6.0-20.0	0.02-0.04	6.6-8.4	<2	Low--------	0.17			
215*: Rock outcrop.											

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
215*:											
Terwilliger-----	0-6	27-35	0.2-0.6	0.13-0.16	6.1-7.3	<2	Moderate	0.37	2	---	<1
	6-30	27-50	0.06-0.2	0.12-0.16	6.6-7.8	<2	High------	0.37			
	30-34	35-50	0.06-0.2	0.10-0.14	6.6-8.4	<2	High------	0.32			
	34	---	---	---	---	---	----------	----			
216*. Rock outcrop											
217, 218--------- Salisbury	0-4	27-35	0.2-0.6	0.15-0.19	6.6-7.8	<2	Moderate	0.32	2	---	1-2
	4-24	40-50	0.06-0.2	0.13-0.16	6.6-8.4	<2	High------	0.28			
	24-32	---	---	---	---	---	----------	----			
	32-60	0-5	6.0-20.0	0.02-0.04	6.6-8.4	<2	Low-------	0.17			
219, 220--------- Salisbury	0-4	27-35	0.06-0.2	0.14-0.18	6.6-7.8	<2	Moderate	0.28	2	---	1-2
	4-24	40-50	0.06-0.2	0.12-0.15	6.6-8.4	<2	High------	0.24			
	24-32	---	---	---	---	---	----------	----			
	32-60	0-5	6.0-20.0	0.02-0.04	6.6-8.4	<2	Low-------	0.17			
221-------------- Salisbury	0-4	20-27	0.6-2.0	0.10-0.12	6.6-7.8	<2	Low-------	0.32	2	---	1-2
	4-24	40-50	0.06-0.2	0.12-0.15	6.6-8.4	<2	High------	0.24			
	24-32	---	---	---	---	---	----------	----			
	32-60	0-5	6-20.0	0.02-0.04	6.6-8.4	<2	Low-------	0.17			
222, 223--------- Settlemeyer	0-10	18-27	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate	0.37	5	---	1-2
	10-66	27-35	0.2-0.6	0.11-0.15	7.4-8.4	<2	Moderate	0.24			
224-------------- Settlemeyer Variant	0-19	20-27	0.6-2.0	0.14-0.17	7.4-8.4	<2	Low-------	0.43	5	---	2-4
	19-68	35-45	0.06-0.2	0.16-0.19	7.4-8.4	<2	High------	0.37			
	68-80	18-35	0.2-0.6	0.09-0.12	7.9-9.0	<2	Moderate	0.28			
225-------------- Sheld	0-7	5-10	2.0-6.0	0.06-0.10	5.1-6.5	<2	Low-------	0.20	3	---	1-4
	7-19	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low-------	0.20			
	19-33	6-12	0.6-2.0	0.07-0.09	5.6-6.5	<2	Low-------	0.20			
	33-46	10-20	0.6-2.0	0.07-0.09	5.1-6.5	<2	Low-------	0.20			
	46	---	---	---	---	---	----------	----			
226*, 227*:											
Sheld-----------	0-7	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low-------	0.20	3	---	1-4
	7-19	5-10	2.0-6.0	0.11-0.14	5.1-6.5	<2	Low-------	0.20			
	19-33	6-12	0.6-2.0	0.07-0.09	5.6-6.5	<2	Low-------	0.20			
	33-46	10-20	0.6-2.0	0.07-0.09	5.1-6.5	<2	Low-------	0.20			
	46	---	---	---	---	---	----------	----			
Iller-----------	0-13	3-10	2.0-6.0	0.09-0.12	5.1-6.5	<2	Low-------	0.17	5	---	<1
	13-28	5-12	2.0-6.0	0.09-0.15	5.1-6.5	<2	Low-------	0.20			
	28-37	5-12	0.6-2.0	0.08-0.11	5.1-6.5	<2	Low-------	0.15			
	37-65	10-23	0.6-2.0	0.07-0.09	5.1-6.5	<2	Low-------	0.15			
228-------------- Snell	0-4	20-27	0.6-2.0	0.08-0.12	6.1-7.3	<2	Low-------	0.28	2	---	1-2
	4-21	35-45	0.2-0.6	0.06-0.10	6.1-7.3	<2	High------	0.20			
	21	---	---	---	---	---	----------	----			
229, 230, 231---- Stoner	0-12	8-17	2.0-6.0	0.07-0.10	5.6-6.5	<2	Low-------	0.20	5	---	1-2
	12-36	9-18	0.6-2.0	0.07-0.11	5.6-6.5	<2	Low-------	0.24			
	36-60	10-20	0.6-2.0	0.06-0.08	5.6-6.5	<2	Low-------	0.24			
232, 233, 234---- Terwilliger	0-6	27-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.43	2	---	<1
	6-30	27-50	0.06-0.2	0.12-0.16	6.6-7.8	<2	High------	0.37			
	30-34	35-50	0.06-0.2	0.10-0.14	6.6-8.4	<2	High------	0.32			
	34	---	---	---	---	---	----------	----			
235-------------- Terwilliger	0-6	27-35	0.2-0.6	0.13-0.16	6.1-7.3	<2	Moderate	0.37	2	---	<1
	6-30	27-50	0.06-0.2	0.12-0.16	6.6-7.8	<2	High------	0.37			
	30-34	35-50	0.06-0.2	0.10-0.14	6.6-8.4	<2	High------	0.32			
	34	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
236-------------- Uhlig Variant	0-14	10-16	0.6-2.0	0.11-0.13	5.6-6.5	<2	Low--------	0.28	3	8	1-2
	14-42	12-18	0.6-2.0	0.11-0.13	5.6-6.5	<2	Low--------	0.28			
	42	---	---	---	---	---	-----------	-----			
237*:											
Weitchpec Variant--------	0-4	20-27	0.6-2.0	0.10-0.11	6.1-7.3	<2	Low--------	0.28	1	---	1-2
	4-8	30-35	0.2-0.6	0.12-0.13	6.1-7.3	<2	Moderate	0.28			
	8-16	30-35	0.2-0.6	0.09-0.10	6.1-7.3	<2	Low--------	0.24			
	16	---	---	---	---	---	-----------	-----			
Rock outcrop.											
238*. Xerofluvents											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In			
101, 102, 103----- Asta	B	None---------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
104, 105---------- Atter	A	Rare---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
106--------------- Atter	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
107*, 108*:													
Avis-------------	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
Oosen------------	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
109*:													
Avis-------------	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
Lava flows.													
110, 111---------- Bogus	C	None---------	---	---	>6.0	---	---	60-80	---	---	---	High-----	High.
112, 113, 114----- Bonnet	B	None---------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
115--------------- Boomer	B	None---------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
116*:													
Boomer-----------	B	None---------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Neuns------------	C	None---------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
117, 118---------- Boomer Variant	B	None---------	---	---	>6.0	---	---	60-80	---	---	---	Moderate	Moderate.
119*, 120*, 121*:													
Chaix------------	B	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	High.
Chawanakee-------	C	None---------	---	---	>6.0	---	---	10-20	Soft	---	---	Moderate	Moderate.
122, 123, 124----- Copsey	D	None---------	---	---	0.5-1.5	Apparent	Dec-Mar	>60	---	---	---	High-----	Low.
125, 126, 127, 128--------------- Deetz	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Hardness	Uncoated steel	Concrete
					Ft			In		In			
129, 130---------- Delaney	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
131--------------- Delaney	A	None---------	---	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Low.
132, 133---------- Delaney	A	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
134--------------- Delaney Variant	C	Frequent----	Brief-----	Jul-Sep	>6.0	---	---	>60	---	---	---	Moderate	Low.
135*:													
Deven------------	D	None---------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rubble land.													
136--------------- Diyou	C	Occasional	Brief-----	Dec-May	2.0-3.0	Apparent	Feb-Jun	>60	---	---	---	High-----	Moderate.
137--------------- Diyou	C	Rare---------	---	---	3.0-5.0	Apparent	Feb-Jun	>60	---	---	---	Moderate	Moderate.
138--------------- Diyou	C	Rare---------	---	---	2.0-3.0	Apparent	Feb-Jun	>60	---	---	---	High-----	Moderate.
139, 140, 141, 142--------------- Dotta	B	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
143*, 144*:													
Dubakella--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
Ipish------------	C	None---------	---	---	>6.0	---	---	60-80	---	---	---	High-----	Moderate.
145*. Dumps													
146, 147---------- Duzel	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	Low------	Moderate.
148*:													
Duzel------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	Low------	Moderate.
Jilson-----------	D	None---------	---	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Facey------------	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Moderate.
149--------------- Esro	D	Frequent----	Very long	Jan-Jun	0-1.0	Apparent	Dec-Aug	>60	---	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Hardness	Uncoated steel	Concrete
					Ft			In		In			
150--------------- Esro	D	Rare---------	---	---	2.0-4.0	Apparent	Dec-Jul	>60	---	---	---	High------	Moderate.
151--------------- Etsel	D	None---------	---	---	>6.0	---	---	6-10	Hard	---	---	Low-------	Moderate.
152--------------- Facey	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Moderate.
153--------------- Gazelle	D	Frequent----	Long------	Nov-May	0-1.5	Perched	Dec-Mar	>60	---	20-40	Thin	High------	Low.
154--------------- Gazelle Variant	D	Occasional	Brief-----	Dec-Jan	0-1.0	Perched	Dec-Apr	>60	---	10-20	Thin	High------	Low.
155, 156, 157----- Hilt	B	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	Moderate	Moderate.
158*:													
Hilt--------------	B	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	Moderate	Moderate.
Rock outcrop.													
159, 160, 161----- Jenny	D	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Low.
162--------------- Jilson	D	None---------	---	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
163*:													
Jilson------------	D	None---------	---	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Duzel-------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	Low-------	Moderate.
164*, 165*:													
Kindig------------	B	None---------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Neuns-------------	C	None---------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
166--------------- Kinkel	B	None---------	---	---	>6.0	---	---	60-80	---	---	---	High------	High.
167, 168---------- Kuck	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	---	High------	Low.
169, 170, 171----- Lassen	D	None---------	---	---	>6.0	---	---	20-40	Hard	---	---	High------	Low.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In			
172*, 173*:													
Lassen-----------	D	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
Kuck-------------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
174*:													
Lassen-----------	D	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
Rock outcrop.													
174*:													
Kuck-------------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
175*. Lava flows													
176*:													
Lava flows.													
Xerorthents.													
177*:													
Lithic Haploxerolls.													
Rock outcrop.													
178*:													
Lithic Xerorthents.													
Rock outcrop.													
179, 180, 181----- Louie	C	None--------	---	---	>6.0	---	---	>60	---	20-40	Thin	High-----	Low.
182--------------- Louie Variant	C	None--------	---	---	>6.0	---	---	>60	---	20-40	Thick	Low------	Low.
183*, 184*:													
Marpa------------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
Kinkel-----------	B	None--------	---	---	>6.0	---	---	60-80	---	---	---	High-----	High.
Boomer-----------	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
185, 186, 187----- Mary	D	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
188*:													
Mary-------------	D	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Rock outcrop.													

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Hardness	Uncoated steel	Concrete
					Ft			In		In			
189, 190, 191----- Medford	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
192, 193, 194----- Montague	D	None--------	---	---	>6.0	---	---	30-48	Soft	20-40	Thick	High-----	Low.
195--------------- Montague Variant	D	None--------	---	---	>6.0	---	---	15-44	Soft	10-20	Thick	High-----	Low.
196*, 197*:													
Neer-------------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	Moderate	Moderate.
Ponto------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	High.
198--------------- Odas	D	Rare--------	---	---	1.5-3.0	Apparent	Jan-Dec	>60	---	---	---	Moderate	Moderate.
199--------------- Oosen	A	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
200--------------- Orset	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
201, 202, 203----- Pinehurst	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
204, 205---------- Pinehurst Variant	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	Moderate	Low.
206--------------- Pit	D	Occasional	Long------	Dec-Mar	2.0-3.0	Apparent	Dec-May	>60	---	---	---	High-----	Low.
207*:													
Plutos-----------	B	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
Rock outcrop.													
208--------------- Ponto	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	High.
209*:													
Ponto------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	High.
Neer-------------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	Moderate	Moderate.
210, 211---------- Redola	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
212*. Riverwash													

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Hardness	Uncoated steel	Concrete
					Ft			In		In			
213*:													
Rock outcrop.													
Dubakella--------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
214*:													
Rock outcrop.													
Louie-----------	C	None--------	---	---	>6.0	---	---	>60	---	20-40	Thin	High-----	Low.
215*:													
Rock outcrop.													
215*:													
Terwilliger------	D	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
216*.													
Rock outcrop													
217, 218, 219, 220, 221--------- Salisbury	D	None--------	---	---	>6.0	---	---	>60	---	20-40	Thick	High-----	Low.
222--------------- Settlemeyer	D	Occasional	Brief-----	Jan-Mar	0	Apparent	Dec-Jun	>60	---	---	---	High-----	Low.
223--------------- Settlemeyer	D	Occasional	Brief-----	Jan-Mar	0-2.0	Apparent	Feb-Jun	>60	---	---	---	High-----	Low.
224--------------- Settlemeyer Variant	D	Common------	Brief-----	Dec-Mar	0-1.5	Apparent	Dec-Apr	>60	---	---	---	High-----	Low.
225--------------- Sheld	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
226*, 227*:													
Sheld------------	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Iller------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
228--------------- Snell	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
229, 230, 231----- Stoner	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
232, 233, 234, 235--------------- Terwilliger	D	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Low.

See footnote at end of table.

TABLE 19.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft			In		In			
236--------------- Uhlig Variant	B	None---------	---	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
237*:													
Weitchpec Variant	D	None---------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rock outcrop.													
238*. Xerofluvents													

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Asta	Fine-loamy, mixed, mesic Andeptic Haplohumults
Atter	Sandy-skeletal, mixed, mesic Typic Xerorthents
Avis	Ashy-skeletal, frigid Dystric Xerorthents
Bogus	Fine, montmorillonitic, mesic Pachic Ultic Argixerolls
Bonnet	Loamy-skeletal, mixed, mesic Calcic Haploxerolls
Boomer	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Boomer Variant	Fine-loamy, mixed, mesic Ultic Haploxeralfs
Chaix	Coarse-loamy, mixed, mesic Dystric Xerochrepts
Chawanakee	Loamy, mixed, mesic, shallow Dystric Xerochrepts
Copsey	Fine, serpentinitic, mesic Vertic Haplaquolls
Deetz	Ashy, mesic Dystric Xeropsamments
Delaney	Ashy, mesic Typic Xeropsamments
Delaney Variant	Coarse-loamy, mixed, nonacid, mesic Typic Xerofluvents
Deven	Clayey, montmorillonitic, mesic Lithic Argixerolls
Diyou	Fine-loamy, mixed, mesic Fluvaquentic Haploxerolls
Dotta	Fine-loamy, mixed, mesic Pachic Argixerolls
Dubakella	Clayey-skeletal, serpentinitic, mesic Mollic Haploxeralfs
Duzel	Fine-loamy, mixed, mesic Typic Argixerolls
Esro	Fine-silty, mixed, frigid Cumulic Haplaquolls
Etsel	Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents
Facey	Fine-loamy, mixed, mesic Typic Argixerolls
Gazelle	Coarse-loamy, mixed, mesic Aquic Durorthids
Gazelle Variant	Loamy, mixed, mesic, shallow Aquic Durorthids
Hilt	Fine-loamy, mixed, mesic Mollic Haploxeralfs
Iller	Medial over loamy-skeletal, mixed, frigid Andic Xerumbrepts
Ipish	Fine-loamy, serpentinitic, mesic Mollic Haploxeralfs
Jenny	Fine, montmorillonitic, mesic Typic Chromoxererts
Jilson	Loamy, mixed, mesic Lithic Argixerolls
Kindig	Loamy-skeletal, mixed, mesic Dystric Xerochrepts
Kinkel	Loamy-skeletal, mixed, mesic Ultic Palexeralfs
Kuck	Fine, montmorillonitic, mesic Vertic Argixerolls
Lassen	Fine, montmorillonitic, mesic Typic Chromoxererts
Louie	Fine-loamy, mixed, mesic Typic Durixeralfs
Louie Variant	Fine-loamy, mixed, mesic Haplic Durixeralfs
Marpa	Loamy-skeletal, mixed, mesic Ultic Haploxeralfs
Mary	Fine-loamy, mixed, mesic Mollic Haploxeralfs
Medford	Fine, montmorillonitic, mesic Pachic Argixerolls
Montague	Fine, montmorillonitic, mesic Typic Chromoxererts
Montague Variant	Clayey, montmorillonitic, mesic, shallow Petrocalcic Palexerolls
Neer	Medial-skeletal, mesic Andic Xerochrepts
Neuns	Loamy-skeletal, mixed, mesic Dystric Xerochrepts
Odas	Coarse-loamy, mixed, nonacid, mesic Cumulic Humaquepts
Oosen	Ashy, frigid Dystric Xeropsamments
Orset	Coarse-loamy, mixed, nonacid, frigid Typic Xerorthents
Pinehurst	Fine-loamy, mixed, frigid Pachic Ultic Argixerolls
Pinehurst Variant	Loamy-skeletal, mixed, mesic Typic Argixerolls
Pit	Fine, montmorillonitic, mesic Chromic Pelloxererts
Plutos	Ashy, mesic Typic Xeropsamments
Ponto	Medial, mesic Andic Xerochrepts
*Redola	Coarse-loamy, mixed, mesic Cumulic Haploxerolls
Salisbury	Fine, montmorillonitic, mesic Typic Durixerolls
Settlemeyer	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
Settlemeyer Variant	Fine, mixed, mesic Typic Argiaquolls
Sheld	Medial-skeletal, frigid Andic Xerumbrepts
Snell	Clayey-skeletal, montmorillonitic, frigid Pachic Argixerolls
Stoner	Coarse-loamy, mixed, mesic Typic Xerochrepts
Terwilliger	Fine, montmorillonitic, mesic Typic Haploxeralfs
Uhlig Variant	Coarse-loamy, mixed, mesic Typic Haploxerolls
Weitchpec Variant	Loamy-skeletal, serpentinitic, mesic Lithic Argixerolls

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1983 O - 328-320 QL 3

U.S. DEPARTMENT OF AGRICULTURE

Washington, D.C. 20013

Soil Survey of Siskiyou County, California, Central Part

E R R A T U M

The following errors were made in printing the soil maps of the soil survey of Siskiyou County, Central Part, California.

Measurements are based on the scale of 1/10 inch = 200 feet, ½ inch = 1,000 feet, and 1 inch = 2,000 feet

Map Sheet #2 HORNBROOK, NE. QUADRANGLE

(A) 2,000 feet E. and 1,300 feet N. from the SW. cor. sec. 8, R. 6 W., T. 47 N., arrow in symbol 167 in soil delineation.

(B) 800 feet W. and 1,200 feet N. from the SE. cor. sec. 20, R. 6 W., T. 47 N., change soil Henly to Henley.

Map Sheet #3 COPCO, NW. QUADRANGLE

(A) 1,200 feet N. on sec. line from the SW. cor. sec. 7, R. 5 W., T. 47 N., put symbol 174 in soil delineation.

(B) 1,600 feet N. and 1,900 feet W. from the SE. cor. sec. 14, R. 5 W., T. 47 N., change soil symbol 127 to 172.

(C) Sec. 25, R. 5 W., T. 47 N., cross out SOUTHERN PACIFIC.

Map Sheet #4 COPCO, NE. QUADRANGLE

(A) 2,200 feet S. and 600 feet E. from the NE. cor. sec. 36, R. 5 W., T. 47 N., change soil symbol 153 to 171.

(B) In sections 1, 3, 21 and 33, R. 4 W., T. 47 N., change SNF* to KNF*.

(C) 200 feet N. and 100 feet E. form the cor. of where the neat line of the map and the limit of soil survey boundary meet, put in the symbol S in map unit 201 for the Pinehurst modal soil site.

Map Sheet #5 MACDOEL, NW. QUADRANGLE

(A) 1,500 feet S. and 600 feet E. from the NW, cor. sec. 32, R. 3 W., T. 48 N., change soil symbol from 133 to 160. Also in same sec., change SNF* to KNF*.

Map Sheet #8 COPCO, SE. QUADRANGLE

(A) 1,000 feet N. and 300 feet E. from the SW. cor. sec. 18, R. 4 W., T. 46 N., change soil symbol 100 to 160.

(B) In sec. 35, R. 4 W., T. 46 N., change SHASTA TO KLAMATH.

Map Sheet #11 FT. JONES, NE. QUADRANGLE

(A) 2,600 feet S. and 700 feet W. from the NE. cor. sec. 3, R. 9 W., T. 44 N., put the S symbol in map unit 184 for the Boomer modal soil site.

Map Sheet #12 YREKA, NW. QUADRANGLE

(A) 2,400 feet N. and 1,700 feet E. from the SW. cor. sec. 23, R. 8 W., T. 44 N., change soil symbol 142 to 144.

(B) 2,000 feet N. and 1,700 feet E. from the SW. cor. sec. 23, R. 8 W., T. 44 N., change soil symbol 232 to 237.

Soil Survey of Siskiyou County, California, Central Part

ERRATUM

Map Sheet #14 LAKE SHASTINA, NW. QUADRANGLE

(A) 300 feet S. and 900 feet W. from the NE. cor. sec. 22, R. 5 W., T. 45 N., change soil symbol 157 to 173.

Map Sheet #15 LAKE SHASTINA, NE. QUADRANGLE

(A) In sec. 23, R. 4 W., T. 45 N., change SHASTA TO KLAMATH.

(B) In sections 2, 14, and 24, R. 4 W., T. 44 N., change SNF* to KNF*.

Map Sheet #17 SCOTT BAR, NE. QUADRANGLE

(A) 1,300 feet S. and 2,500 feet E. from the NW. cor. sec. 28, R. 10 W., T. 44 N., change soil symbol 184 to 213.

(B) In same sec. 28, add a delineation line from where soil delineation line 165 peeks, north to the river. This will split the soil delineation 184 from the changed 213.

Map Sheet #18 FT. JONES, SW. QUADRANGLE

(A) 3,300 feet N. and 2,000 feet E. from the SW. cor. sec. 32, R. 9 W., T. 44 N., change soil symbol 172 to 137.

Map Sheet #22 LAKE SHASTINA, SW. QUADRANGLE

(A) 300 feet S. and 2,000 feet E. from the NW. cor. sec. 23, R. 5 W., T. 43 N., change soil symbol 104 to 185.

(B) 2,700 feet S. and 1,000 feet E. from the NW. cor. sec. 24, R. 5 W., T. 43 N., change soil symbol 203 to 132.

Map Sheet #23 LAKE SHASTINA, SE. QUADRANGLE

(A) 2,400 feet N. and 2,200 feet W. from the SE. cor. sec. 24, R. 5 W., T. 43 N., change soil symbol 203 to 132.

(B) 1,500 feet N. and 3,400 feet W. from the SE. cor. sec. 24, R. 5 W., T. 43 N., change soil symbol 203 to 132.

(C) In sections 8, 10, 14, 18, and 20, R. 4 W., T. 43 N., change SNF* to KNF*.

Map Sheet #27 CHINA MTN., NW. QUADRANGLE

(A) 1,300 feet N. and 2,000 feet W. from the SW. cor. sec. 18, R. 7 W., T. 41 N., change soil symbol 107 to 231.

Index to Map Sheets

Location of Profiles Representative of Soil Series. Montaque and Montaque Variant should be Montague and Montague Variant.

* SNF = Shasta National Forest
* KNF = Klamath National Forest

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MAP UNITS*

SOILS ON FLOOD PLAINS, IN BASINS, AND ON TERRACES, ALLUVIAL FANS, AND GLACIAL OUTWASH FANS

1 — Settlemeyer-Diyou: Very deep, nearly level and gently sloping, poorly drained and somewhat poorly drained loams; on flood plains

2 — Gazelle: Moderately deep, nearly level, very poorly drained silt loams that are underlain by a hardpan; in basins

3 — Salisbury-Louie: Moderately deep, nearly level to strongly sloping, well drained cobbly loams and stony loams that are underlain by a hardpan; on terraces

4 — Stoner-Dotta: Very deep, nearly level to strongly sloping, well drained, gravelly sandy loams and loams; on alluvial fans

5 — Delaney-Plutos: Very deep to moderately deep, nearly level to moderately steep, somewhat excessively drained sands and loamy sands; on glacial outwash fans

SOILS ON LOWER FOOTHILLS OF THE CASCADE MOUNTAIN RANGE

6 — Lassen-Kuck-Mary: Moderately deep, gently sloping to steep, well drained clays, clay loams, and stony loams; on foothills

SOILS OF THE CASCADE MOUNTAIN RANGE

7 — Pinehurst-Bogus: Deep and very deep, gently sloping to steep, well drained stony loams; on mountains

8 — Avis-Sheld-Iller: Very deep and deep, moderately sloping to very steep, well drained and somewhat excessively drained very stony sandy loams and stony sandy loams; on mountains

9 — Ponto-Deetz-Neer: Very deep and moderately deep, nearly level to steep, somewhat excessively drained and well drained sandy loams, gravelly loamy sands, and gravelly sandy loams; on mountains

SOILS DOMINANTLY IN THE KLAMATH MOUNTAIN RANGE

10 — Duzel-Jilson: Moderately deep and shallow, moderately sloping to very steep, well drained gravelly loams; on mountains

11 — Marpa-Kinkel-Boomer: Moderately deep to very deep, gently sloping to very steep, well drained gravelly loams and very gravelly loams; on mountains

12 — Kindig-Neuns: Deep and moderately deep, moderately steep to very steep, well drained gravelly loams; on mountains

13 — Rock outcrop-Lithic Haploxerolls-Lithic Xerorthents: Rock outcrop, and very shallow, nearly level to very steep, excessively drained soils that are variable in texture; on mountains

*Terms for texture refer to the dominant texture of the surface layer of the major soils.

Compiled 1981

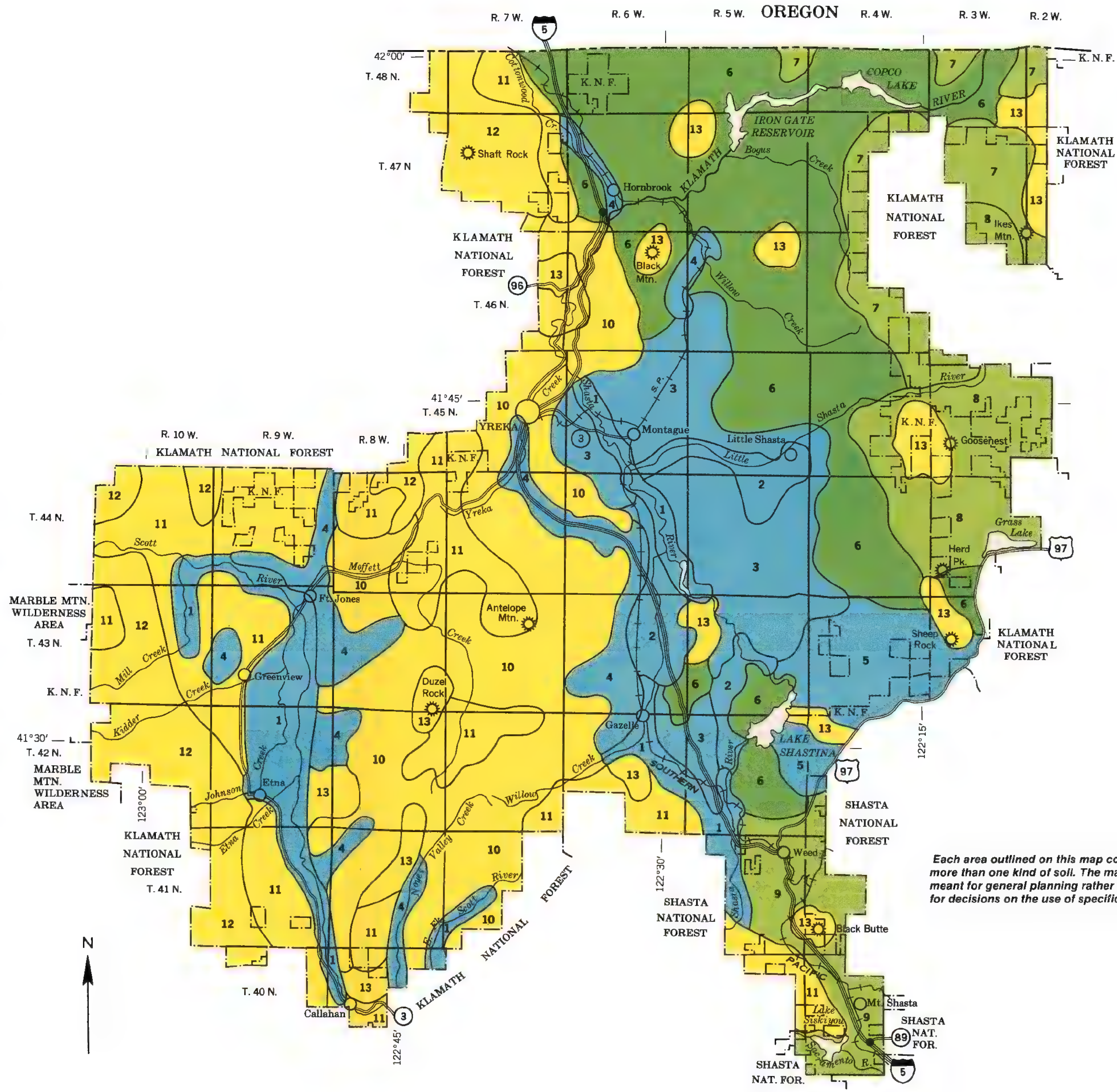
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U.S. FOREST SERVICE
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART

Scale 1: 380,160

1 0 1 2 3 4 5 Miles



Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

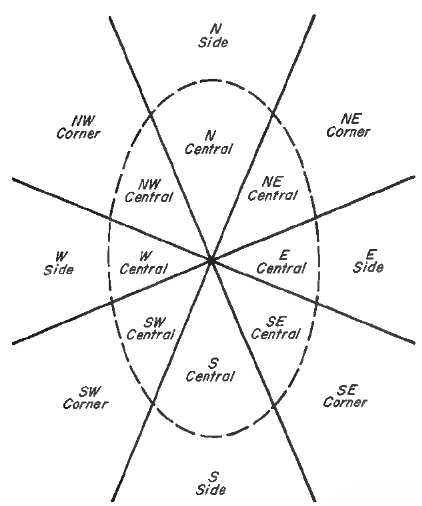
LOCATION OF PROFILES REPRESENTATIVE OF SOIL SERIES

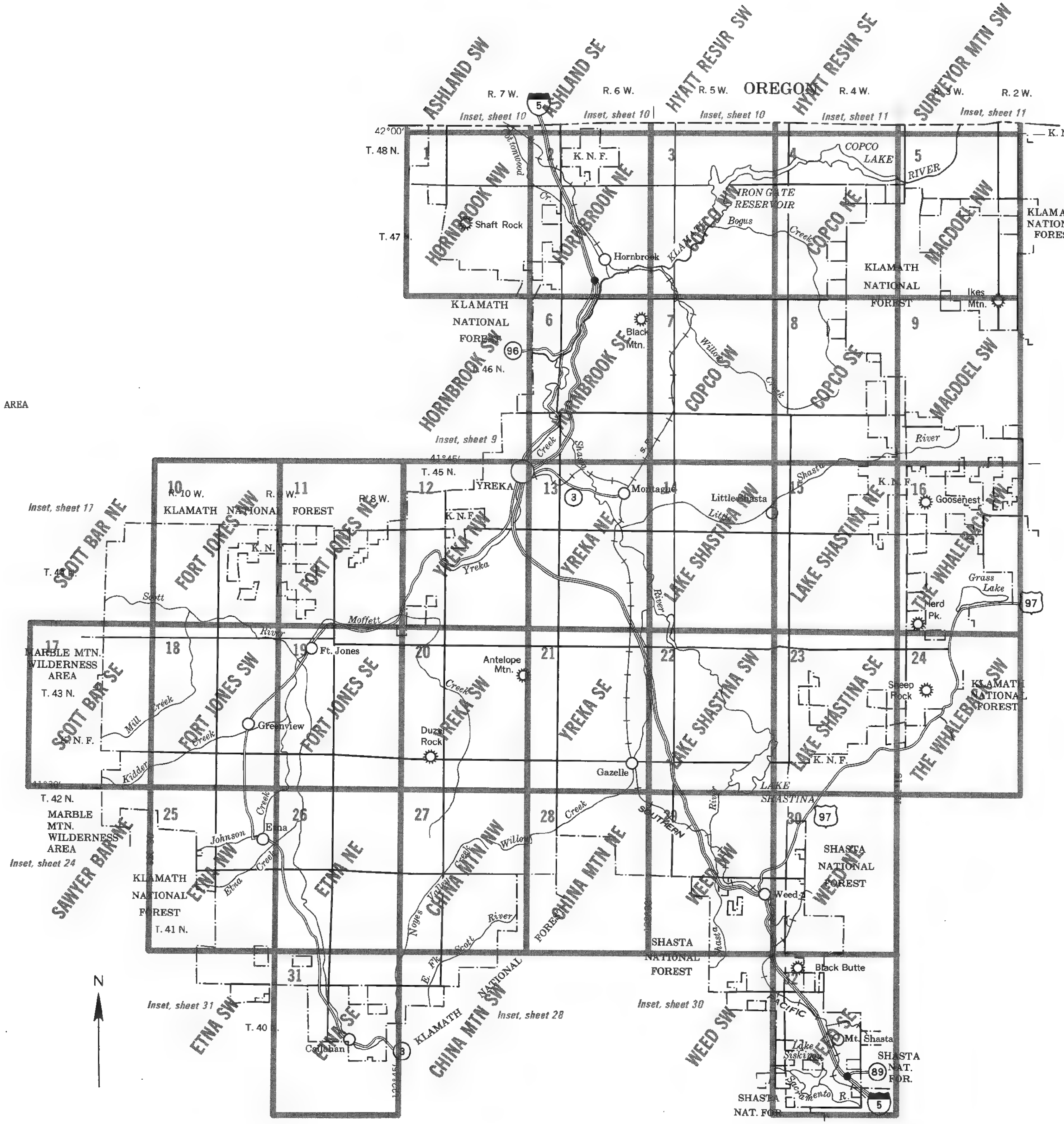
Series	Map-Sheet	Location
Asta	32	S Side
Atter	18	S Central
Avis	16	N Side
Bogus	8	N Central
Bonnet	21	SE Central
Boomer	11	W Side
Boomer Variant	1	NE Corner
Chaix	25	N Side
Chawanakee	25	N Side
Copsey	29	W Central
Deetz	30	SW Corner
Delaney	23	SW Corner
Delaney Variant	23	SE Central
Deven	4	N Side
Diyou	26	S Side
Dotta	15	SW Corner
Dubakella	12	W Corner
Duzel	6	SW Central
Esro	16	S Central
Etsel	17	E Side
Facey	21	W Side
Gazelle	22	SW Central
Gazelle Variant	14	NE Central
Hilt	6	E Side
Iller	16	SW Corner
Ipish	12	SW Corner
Jenny	7	SE Corner
Jilson	20	E Central
Kindig	17	NE Corner
Kinkel	12	NW Corner
Kuck	8	SW Corner
Lassen	7	NE Central
Louie	23	NW Corner
Louie Variant	7	SW Central
Marpa	31	NW Central
Mary	7	NW Central
Medford	8	N Central
Montaque	7	SW Central
Montaque Variant	13	NE Central
Neer	32	SE Central
Neuns	18	W Side
Oosen	16	SW Corner
Pinehurst	4	S Side
Pinehurst Variant	11(inset)	NW Corner
Pit	13	SE Central
Plutos	23	SE Central
Ponto	32	SE Corner
Redola	23	N Central
Salisbury	14	SW Central
Settlemeyer	13	E Central
Settlemeyer Variant	19	SW Central
Sheld	16	SW Corner
Stoner	26	E Central
Terwilliger	7	NW Central
Uhlig Variant	29	NE Central
Weitchpec Variant	12	S Side

SERIES LISTED BUT ARE OUTSIDE SURVEY AREA

Odas
Orset
Snell

INDEX TO LOCATIONS ON MAP SHEETS





INDEX TO MAP SHEETS

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART

Scale 1: 380,160
1 0 1 2 3 4 5 Miles

SOIL LEGEND

SYMBOL	NAME
101	Asta gravelly sandy loam, 5 to 15 percent slopes
102	Asta gravelly sandy loam, 15 to 50 percent slopes
103	Asta cobbly sandy loam, 15 to 50 percent slopes
104	Atter very gravelly sandy loam, 0 to 5 percent slopes
105	Atter very cobbly sandy loam, 0 to 5 percent slopes
106	Atter very bouldery loamy fine sand, 5 to 30 percent slopes
107	Avis-Oosen complex, 5 to 30 percent slopes
108	Avis-Oosen complex, 30 to 50 percent slopes
109	Avis-Lava flows complex, 5 to 30 percent slopes
110	Bogus stony loam, 15 to 50 percent slopes
111	Bogus very stony loam, 15 to 50 percent slopes
112	Bonnet loam, 0 to 2 percent slopes
113	Bonnet gravelly loam, 0 to 2 percent slopes
114	Bonnet gravelly loam, 2 to 5 percent slopes
115	Boomer loam, cool, 5 to 30 percent slopes
116	Boomer, cool-Neuns complex, 30 to 70 percent slopes
117	Boomer Variant sandy loam, 30 to 50 percent slopes
118	Boomer Variant stony sandy loam, 5 to 30 percent slopes
119	Chaix-Chawanakee gravelly coarse sandy loams, 5 to 30 percent slopes
120	Chaix-Chawanakee gravelly coarse sandy loams, 30 to 50 percent slopes
121	Chaix-Chawanakee gravelly coarse sandy loams, 50 to 70 percent slopes
122	Copsey clay, 0 to 9 percent slopes
123	Copsey gravelly clay, 2 to 9 percent slopes
124	Copsey cobbly clay, 2 to 9 percent slopes
125	Deetz gravelly loamy sand, 0 to 5 percent slopes
126	Deetz gravelly loamy sand, 5 to 15 percent slopes
127	Deetz stony loamy sand, 2 to 15 percent slopes
128	Deetz stony loamy sand, 15 to 30 percent slopes
129	Delaney sand, 0 to 9 percent slopes
130	Delaney gravelly sand, 0 to 9 percent slopes
131	Delaney stony sand, 0 to 15 percent slopes
132	Delaney sandy loam, 0 to 2 percent slopes
133	Delaney sandy loam, 2 to 5 percent slopes
134	Delaney Variant silt, 0 to 2 percent slopes
135	Deven-Rubble land complex, 0 to 30 percent slopes
136	Diyou loam
137	Diyou loam, drained
138	Diyou loam, peat substratum
139	Dotta loam, 0 to 2 percent slopes
140	Dotta loam, 2 to 9 percent slopes
141	Dotta gravelly loam, 0 to 2 percent slopes
142	Dotta gravelly loam, 2 to 5 percent slopes
143	Dubakella-Ipish complex, 5 to 30 percent slopes
144	Dubakella-Ipish complex, 30 to 50 percent slopes
145	Dumps
146	Duzel gravelly loam, 5 to 9 percent slopes
147	Duzel gravelly loam, 9 to 15 percent slopes
148	Duzel-Jilson-Facey complex, 15 to 50 percent slopes
149	Esro silt loam
150	Esro silt loam, drained
151	Etsel very gravelly loam, 30 to 75 percent slopes
152	Facey loam, 5 to 15 percent slopes
153	Gazelle silt loam
154	Gazelle Variant sandy clay loam
155	Hilt sandy loam, 2 to 15 percent slopes
156	Hilt sandy loam, 15 to 30 percent slopes
157	Hilt stony sandy loam, 2 to 50 percent slopes
158	Hilt-Rock outcrop complex, 2 to 50 percent slopes
159	Jenny clay, 0 to 2 percent slopes
160	Jenny clay, 2 to 15 percent slopes
161	Jenny cobbly clay, 0 to 15 percent slopes
162	Jilson gravelly loam, 50 to 65 percent slopes
163	Jilson-Duzel gravelly loams, 5 to 50 percent slopes
164	Kindig-Neuns gravelly loams, 15 to 50 percent slopes
165	Kindig-Neuns gravelly loams, 50 to 80 percent slopes
166	Kinkel very gravelly loam, 2 to 15 percent slopes
167	Kuck clay loam, 2 to 9 percent slopes
168	Kuck clay loam, 9 to 15 percent slopes
169	Lassen clay, 2 to 9 percent slopes
170	Lassen clay, 9 to 15 percent slopes
171	Lassen cobbly clay, 2 to 15 percent slopes
172	Lassen-Kuck complex, 15 to 50 percent slopes
173	Lassen-Kuck complex, stony, 2 to 50 percent slopes
174	Lassen-Rock outcrop-Kuck complex, 2 to 50 percent slopes
175	Lava flows
176	Lava flows-Xerorthents complex, 0 to 50 percent slopes*
177	Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes*
178	Lithic Xerorthents-Rock outcrop complex, 0 to 65 percent slopes*
179	Louie loam, 0 to 2 percent slopes
180	Louie loam, 2 to 9 percent slopes
181	Louie stony loam, 0 to 9 percent slopes
182	Louie Variant sandy clay loam, 2 to 9 percent slopes
183	Marpa-Kinkel-Boomer, cool complex, 5 to 15 percent slopes
184	Marpa-Kinkel-Boomer, cool complex, 15 to 50 percent slopes
185	Mary loam, 2 to 9 percent slopes
186	Mary loam, 9 to 15 percent slopes
187	Mary stony loam, 2 to 50 percent slopes
188	Mary-Rock outcrop complex, 2 to 50 percent slopes
189	Medford clay loam, cool, 0 to 2 percent slopes
190	Medford clay loam, cool, 2 to 5 percent slopes
191	Medford clay loam, cool, 5 to 15 percent slopes
192	Montague clay, 0 to 2 percent slopes
193	Montague clay, 2 to 9 percent slopes
194	Montague cobbly clay, 0 to 9 percent slopes
195	Montague Variant clay, 0 to 9 percent slopes
196	Neer-Ponto stony sandy loams, 15 to 50 percent slopes
197	Neer-Ponto complex, 15 to 50 percent slopes
198	Odas sandy loam
199	Oosen loamy sand, 2 to 15 percent slopes
200	Orset sandy loam, 0 to 9 percent slopes
201	Pinehurst stony loam, 2 to 15 percent slopes
202	Pinehurst stony loam, 15 to 30 percent slopes
203	Pinehurst stony loam, 30 to 50 percent slopes
204	Pinehurst Variant very stony loam, 0 to 15 percent slopes
205	Pinehurst Variant very stony loam, 15 to 65 percent slopes
206	Pit clay
207	Plutos-Rock outcrop complex, 0 to 30 percent slopes
208	Ponto sandy loam, 5 to 15 percent slopes
209	Ponto-Neer complex, 2 to 15 percent slopes
210	Redola loam, 0 to 2 percent slopes
211	Redola loam, 2 to 9 percent slopes
212	Riverwash
213	Rock outcrop-Dubakella complex, 30 to 50 percent slopes
214	Rock outcrop-Louie complex, 0 to 15 percent slopes
215	Rock outcrop-Terwilliger complex, 2 to 50 percent slopes
216	Rock outcrop
217	Salisbury clay loam, 0 to 2 percent slopes
218	Salisbury clay loam, 2 to 9 percent slopes
219	Salisbury gravelly clay loam, 0 to 5 percent slopes
220	Salisbury gravelly clay loam, 5 to 9 percent slopes
221	Salisbury cobbly loam, 0 to 9 percent slopes
222	Settlemeyer loam, 0 to 2 percent slopes
223	Settlemeyer loam, drained, 2 to 5 percent slopes
224	Settlemeyer Variant silt loam
225	Sheld very stony sandy loam, 50 to 65 percent slopes
226	Sheld-Iller stony sandy loams, 9 to 30 percent slopes
227	Sheld-Iller stony sandy loams, 30 to 50 percent slopes
228	Snell very stony loam, 5 to 30 percent slopes
229	Stoner gravelly sandy loam, 0 to 2 percent slopes
230	Stoner gravelly sandy loam, 2 to 5 percent slopes
231	Stoner gravelly sandy loam, 5 to 15 percent slopes
232	Terwilliger silty clay loam, 2 to 9 percent slopes
233	Terwilliger silty clay loam, 9 to 15 percent slopes
234	Terwilliger silty clay loam, 15 to 50 percent slopes
235	Terwilliger stony silty clay loam, 2 to 50 percent slopes
236	Uhlig Variant stony loam, 5 to 50 percent slopes
237	Weitchpec Variant-Rock outcrop complex, 5 to 65 percent slopes
238	Xerofluvents, nearly level*

* Broadly defined units

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National
- State
- County, parish, municipo
- Reservation, national or state
- Small park, cemetery, airfield, airport, floodpool, etc — Davis Airstrip — Cem — FLOOD POOL LINE
- Land grant
- Limit of soil survey (labeled)

TOWNSHIP OR RANGE LINE, U.S. LAND SURVEY

SECTION LINE, U.S. LAND SURVEY

TOWNSHIP LINE, NOT U. S. LAND SURVEY

SECTION LINE, NOT U.S. LAND SURVEY

SECTION CORNER: Found - Indicated

BOUNDARY MONUMENT

ROADS

- Divided, hard surface
- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Unimproved road
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 70
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROADS

- Single track
- Multiple track

LEVEES

- Without road
- With road
- With railroad

POWER TRANSMISSION LINE

LANDMARK LINE (labeled as to type) — TELEPHONE

OVERPASS - UNDERPASS

DAMS

- Large dam
- Small dam: masonry - earth — w — water

MISCELLANEOUS MAP FEATURES

- Buildings (dwelling, farmstead, etc.)
- School - Church
- Buildings (barn, warehouse, etc.)
- Tanks: oil, water (labeled only if water) — Water Tank
- Wells other than water (labeled as to type) — Oil — Gas
- U.S. mineral or location monument - Prospect
- Quarry - Gravel Pit
- Mine shaft - Tunnel or cave entrance
- Campsite - Picnic area
- Located or landmark object - Windmill
- Foreshore flat
- Horizontal control station
- Vertical control station — BM × 671 × 672
- Road fork - Section corner with elevation — 429 — 58
- Checked spot elevation — × 5970

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

CANALS OR DITCHES

- Double line — CANAL
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — w — water
- Intermittent — int — intermittent

MISCELLANEOUS WATER FEATURES

- Land subject to controlled inundation
- Marsh or swamp
- Aqueduct tunnel

- Spring
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 102 — 108

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

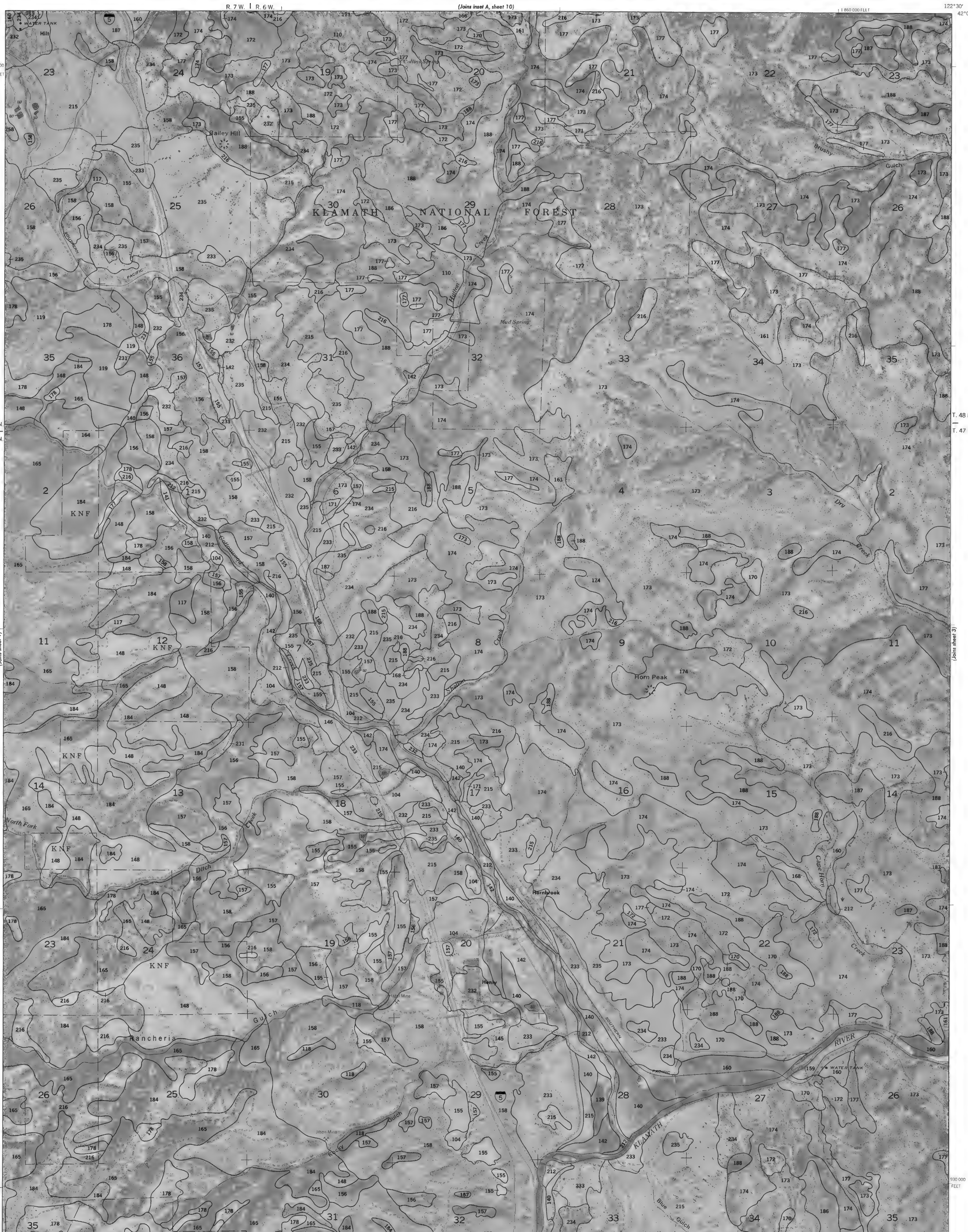
SOIL SAMPLE SITE — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Saline spot
- Severely eroded spot
- Slide or slip (tips point up slope)
- Stony spot - Very stony spot
- Rock outcrop

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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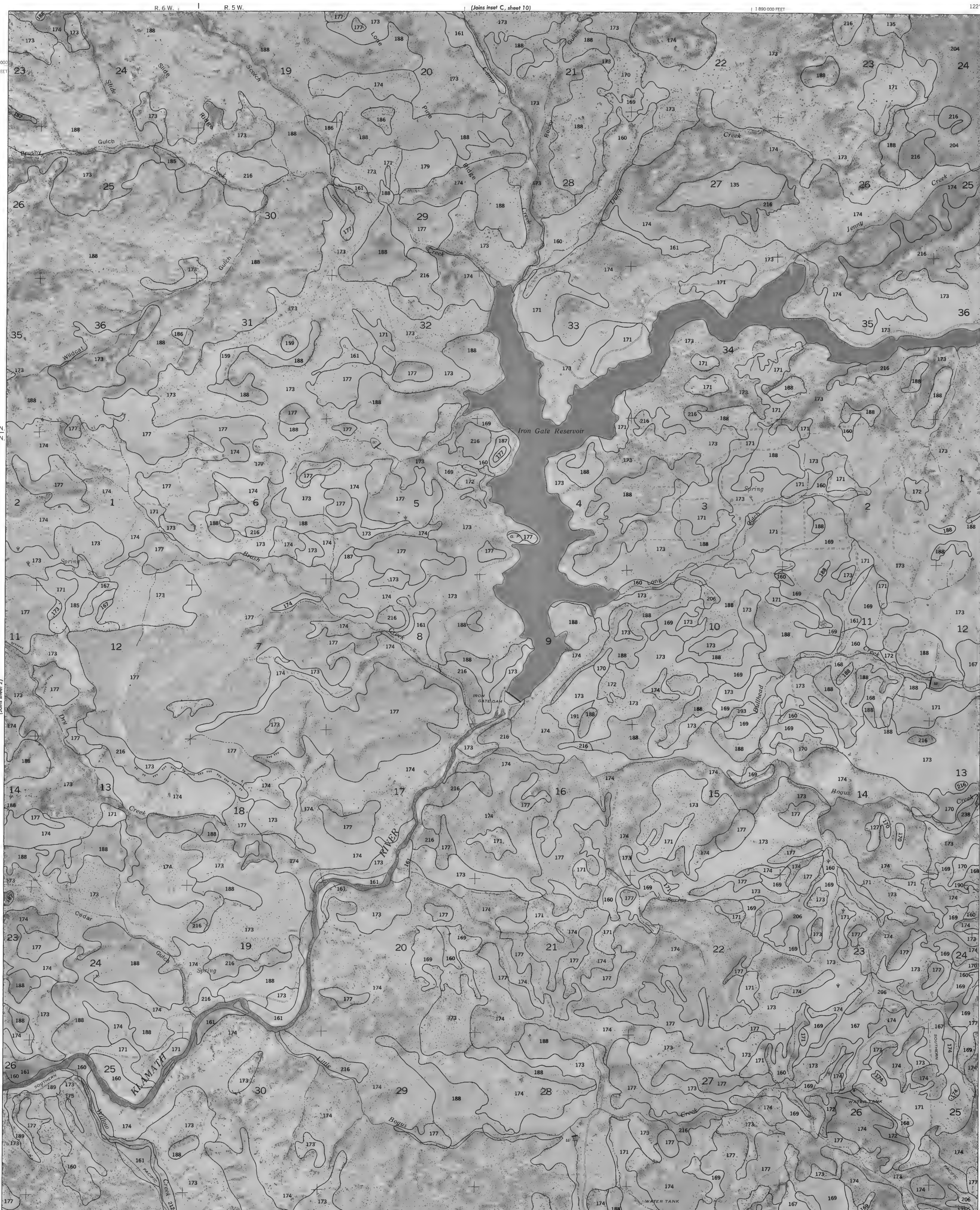
SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 2



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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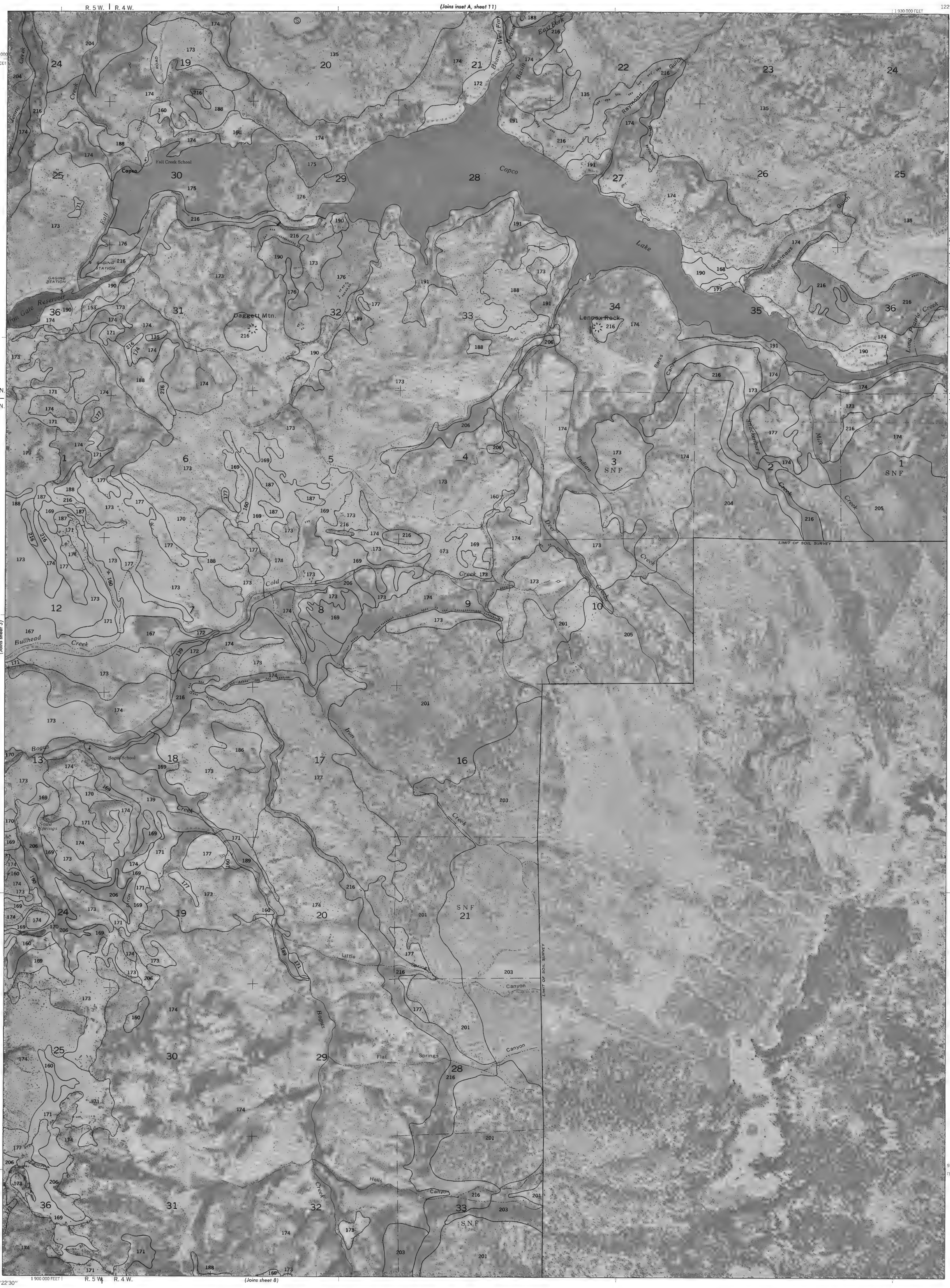

SCALE 1:24000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

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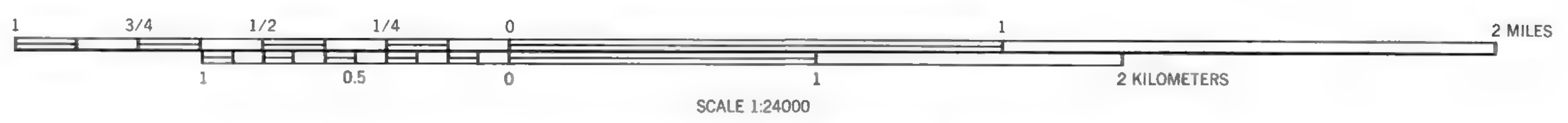

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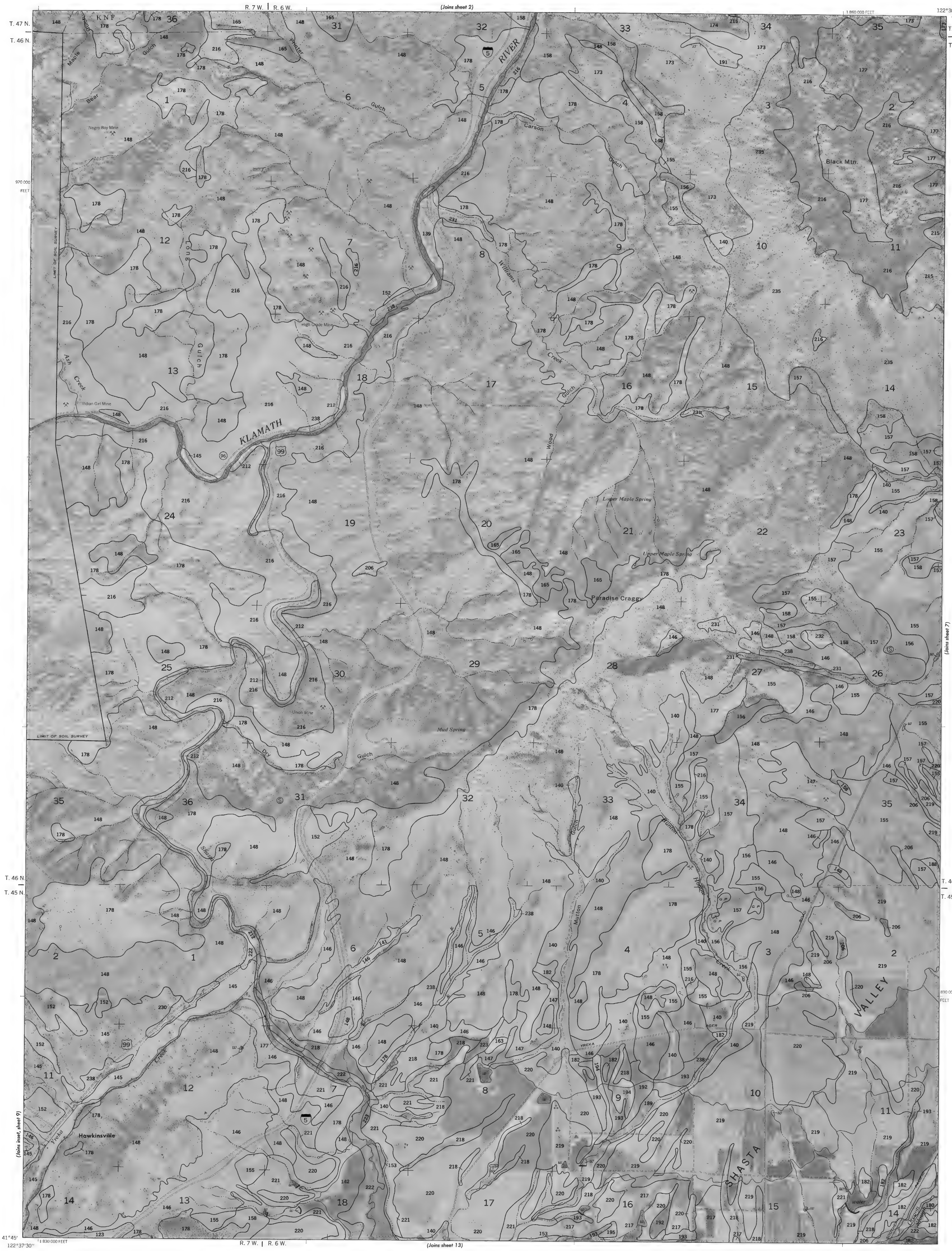

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24000

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 6

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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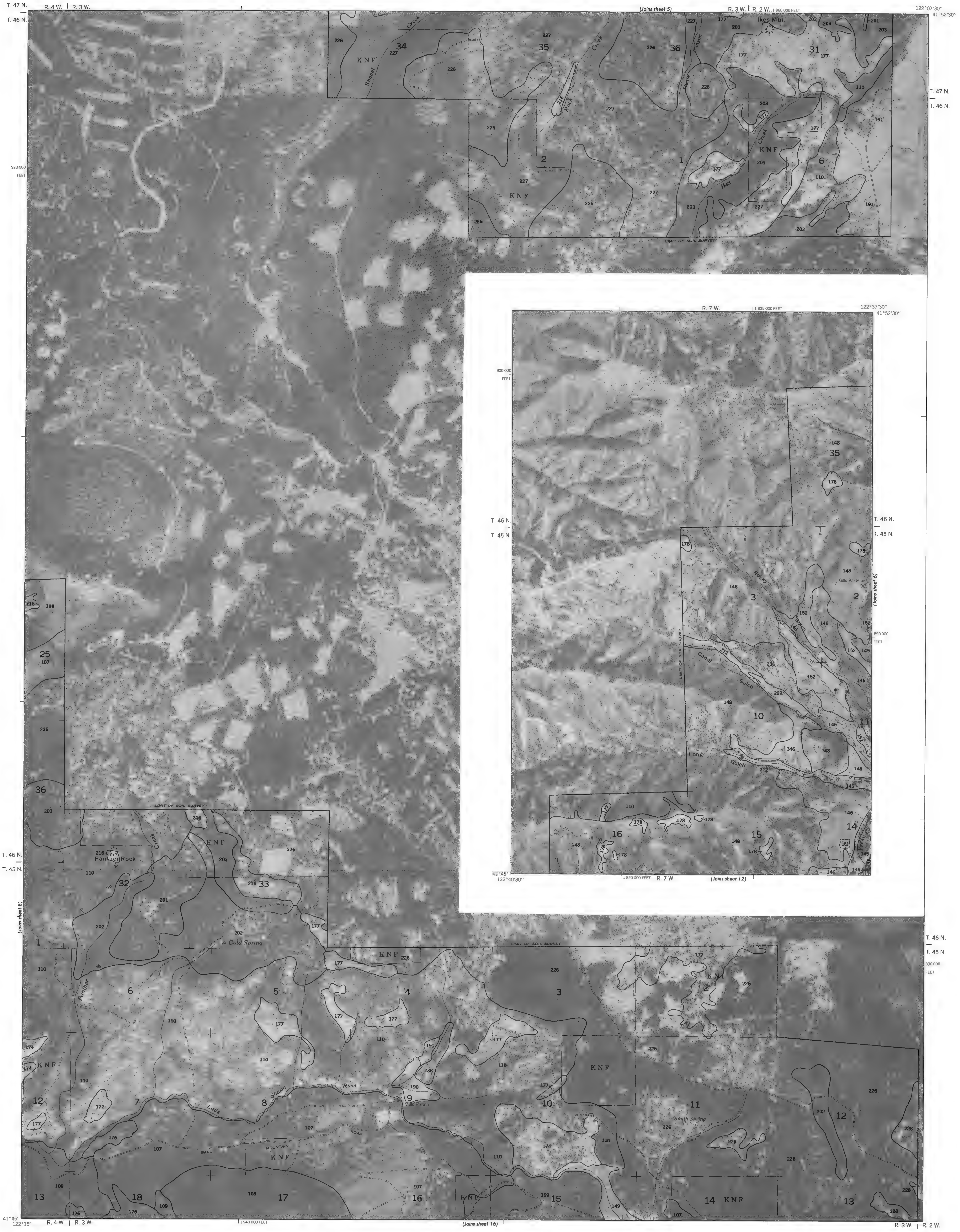
SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 7

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

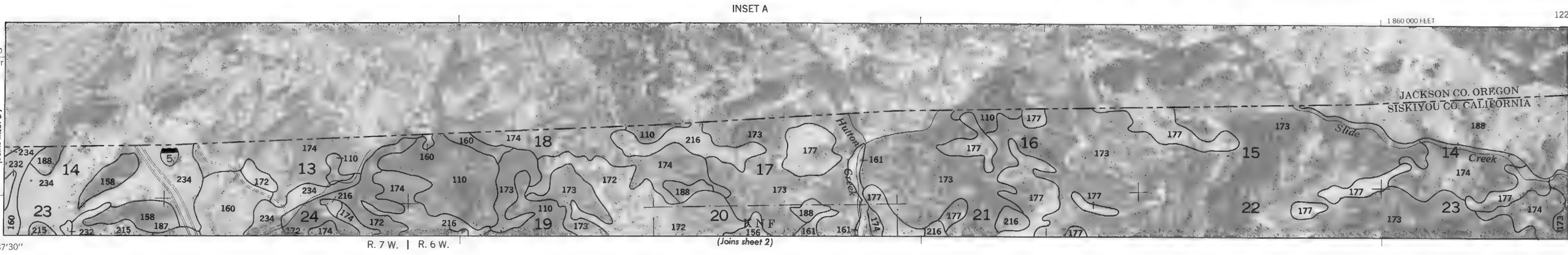
1 0.5 0 1 2 KILOMETERS

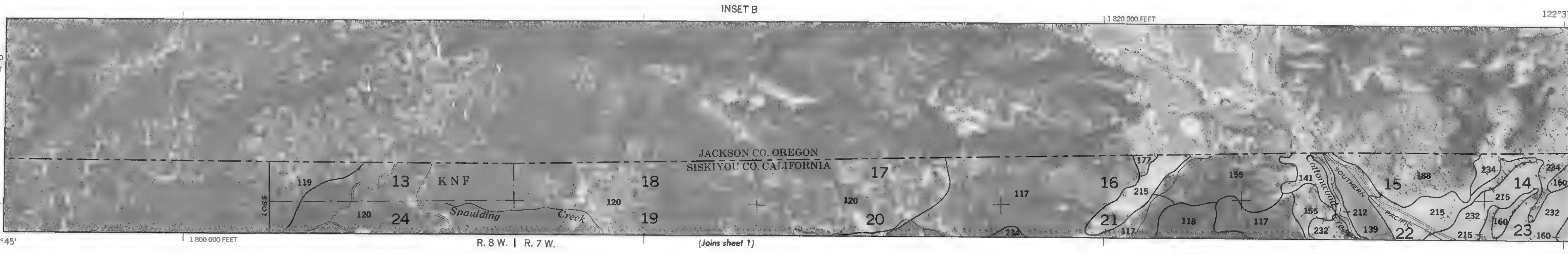
SCALE 1:24000

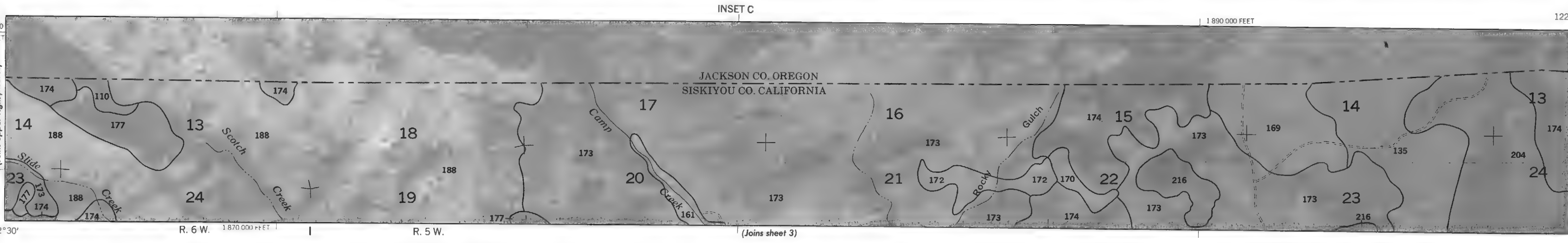


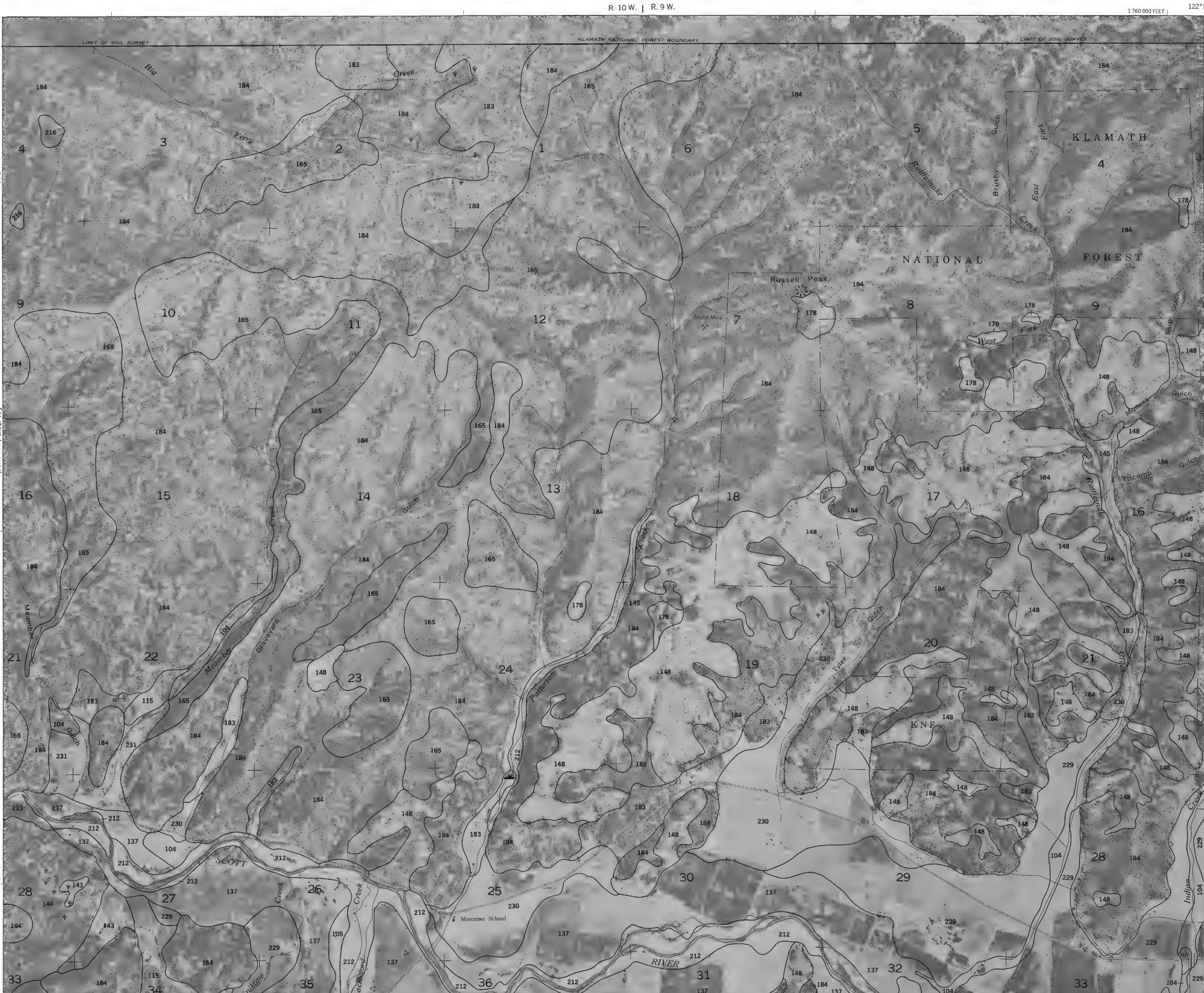
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.









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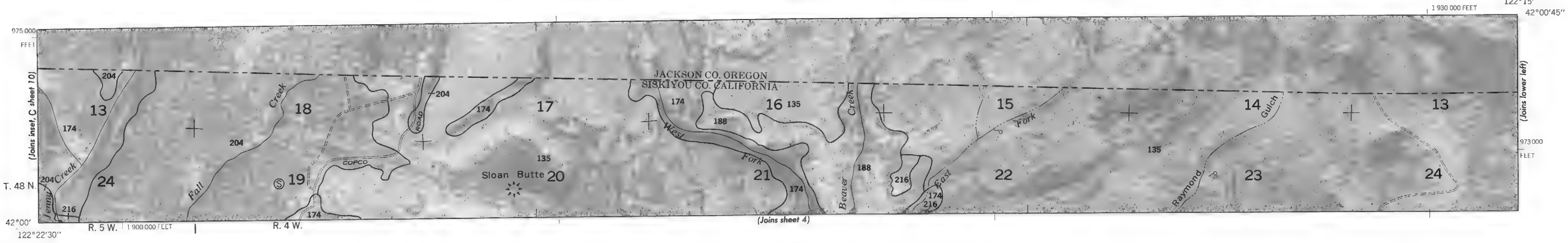
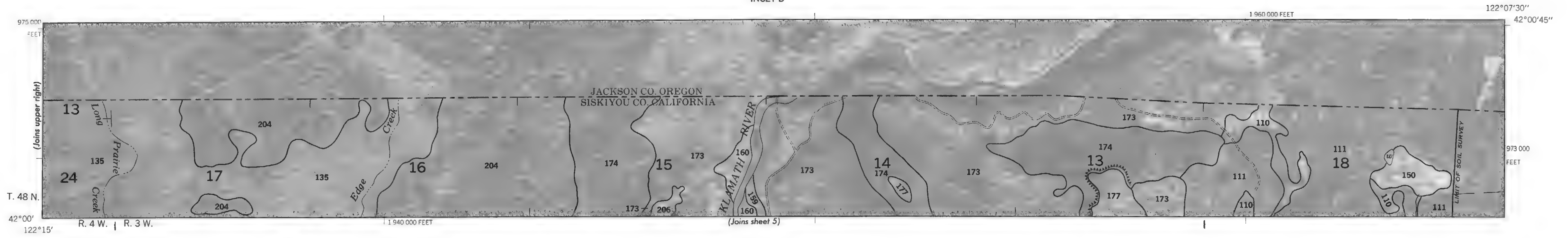
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

INSET A



INSET B



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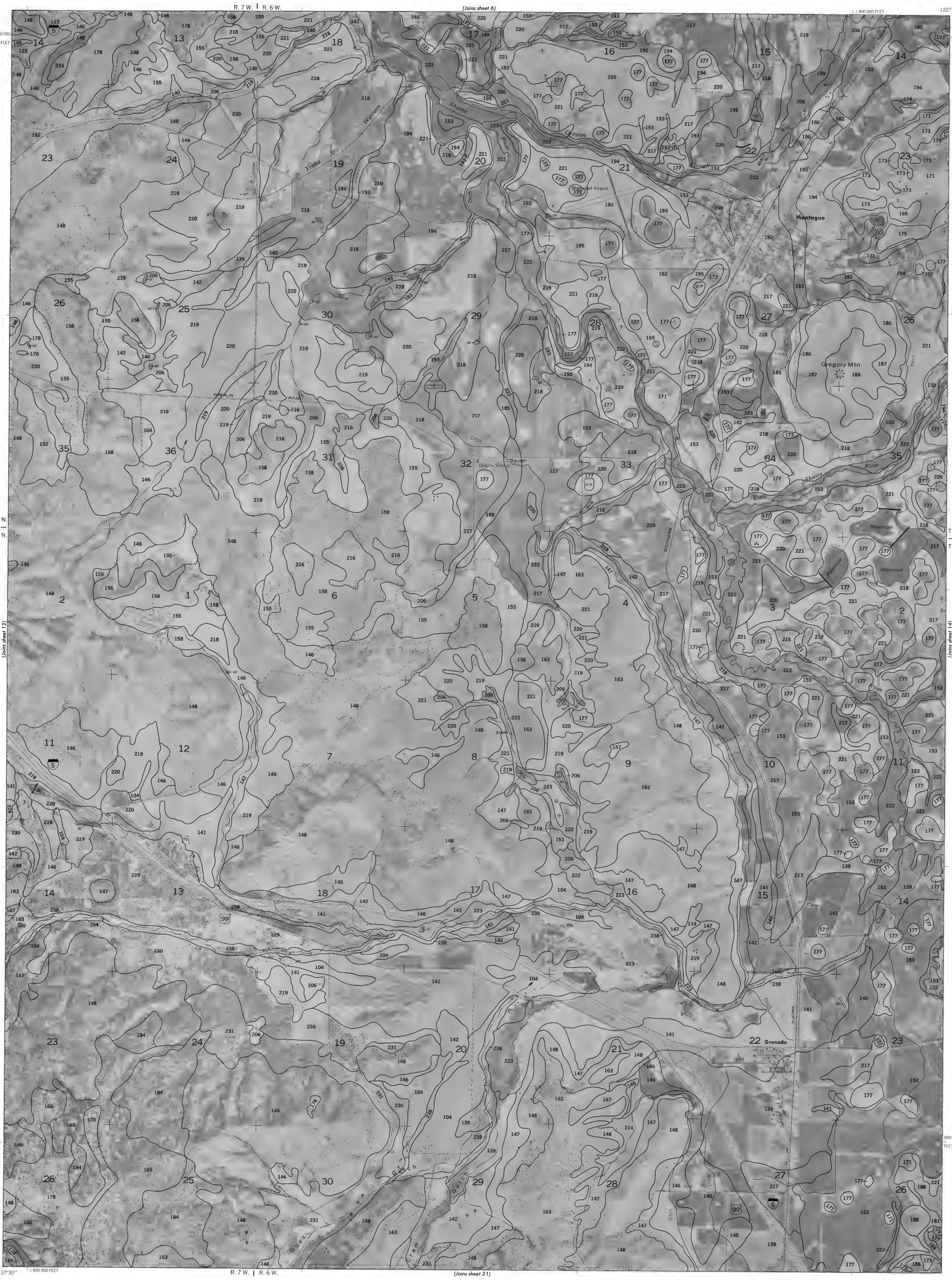
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

(YREKA, N.W. QUADRANGLE)

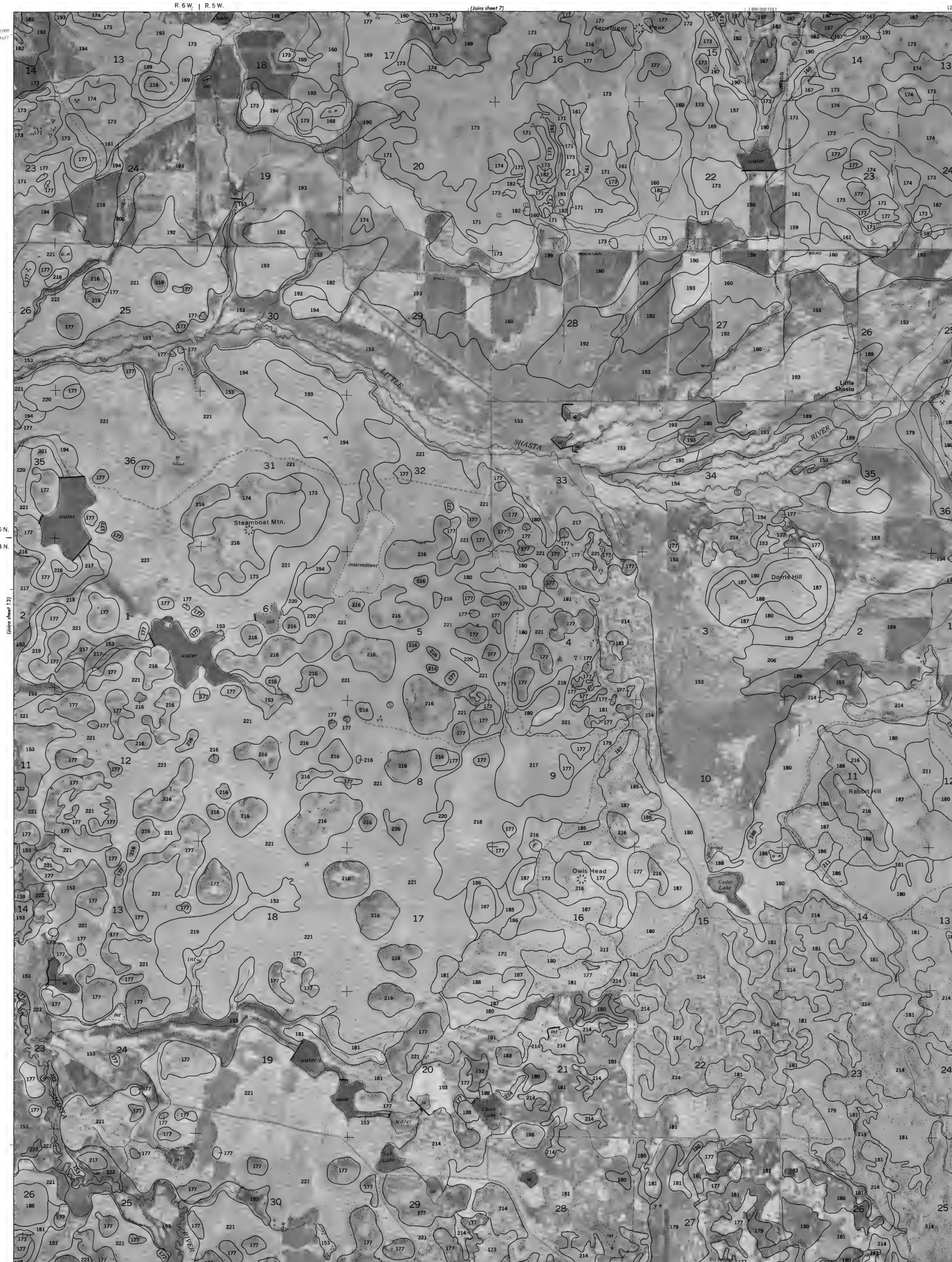
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 14

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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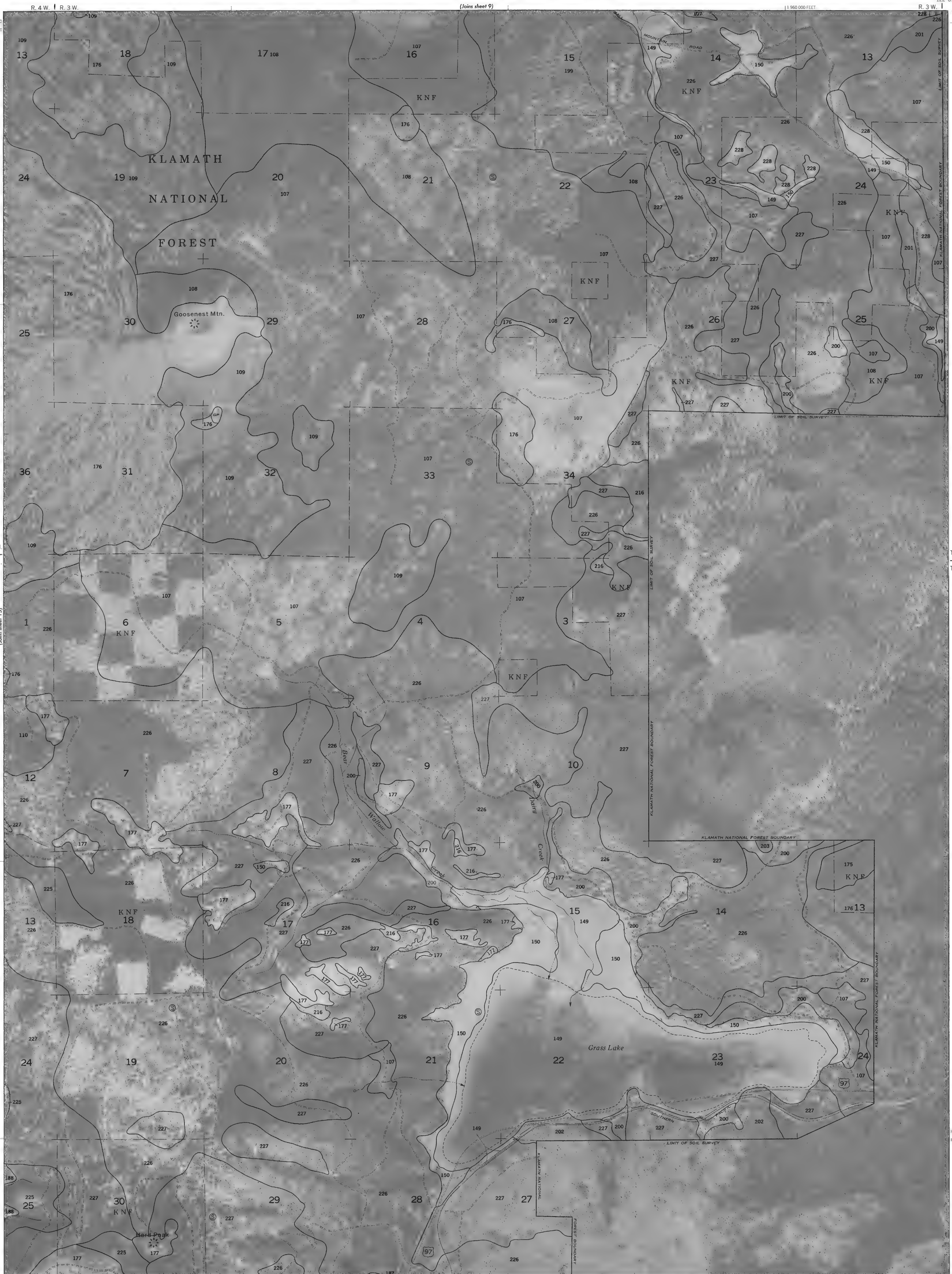
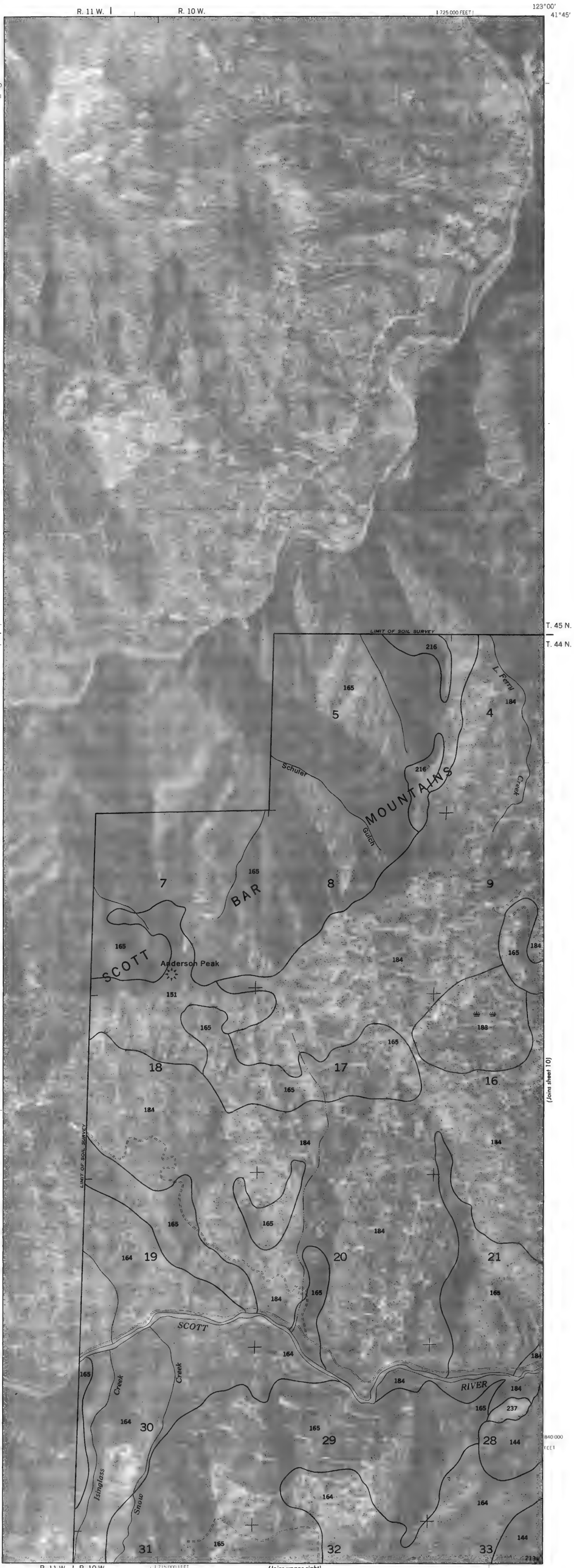


1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 19
SOIL SURVEY OF SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART
(FT. JONES, S.E. QUADRANGLE)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 19

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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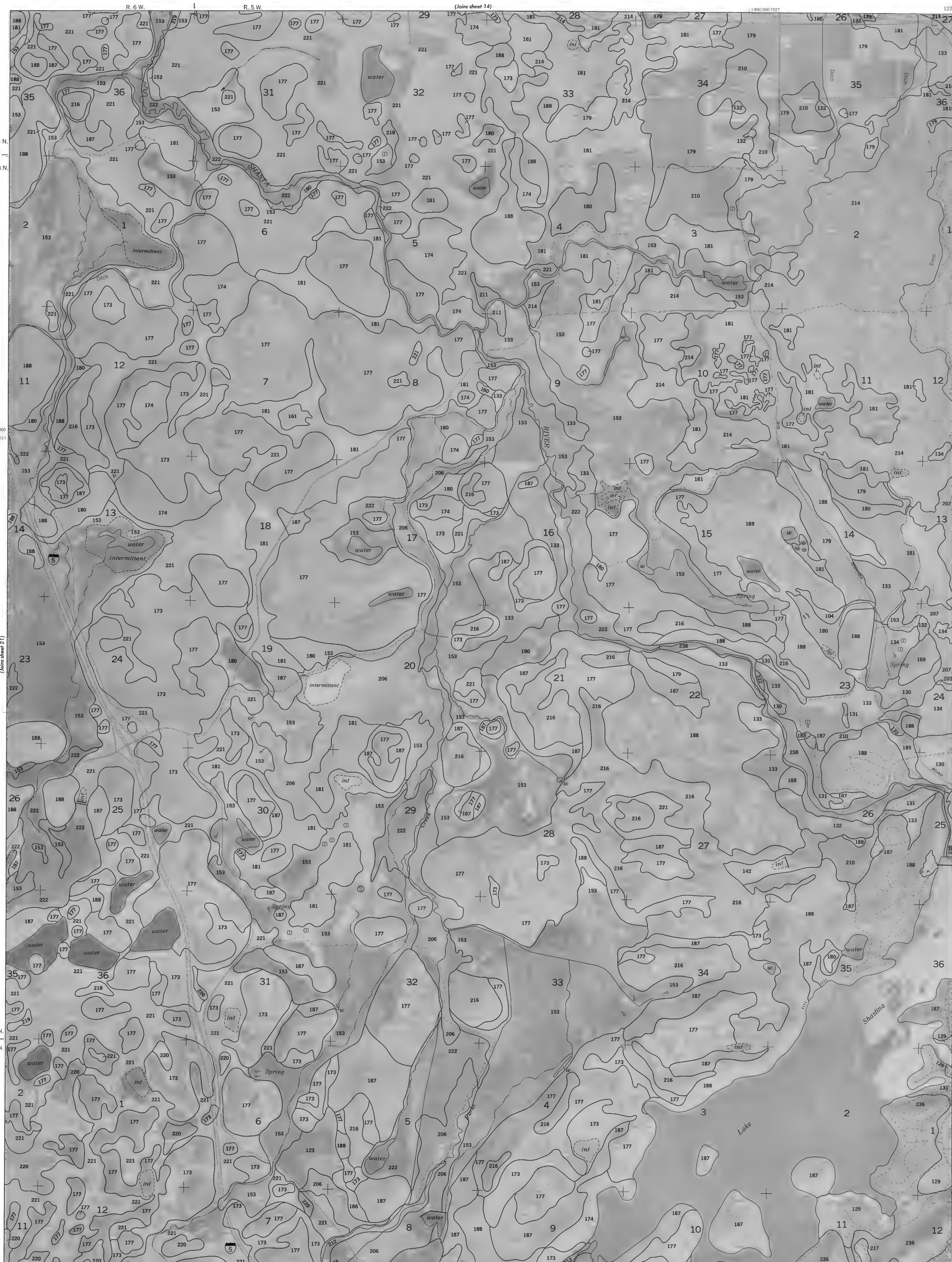

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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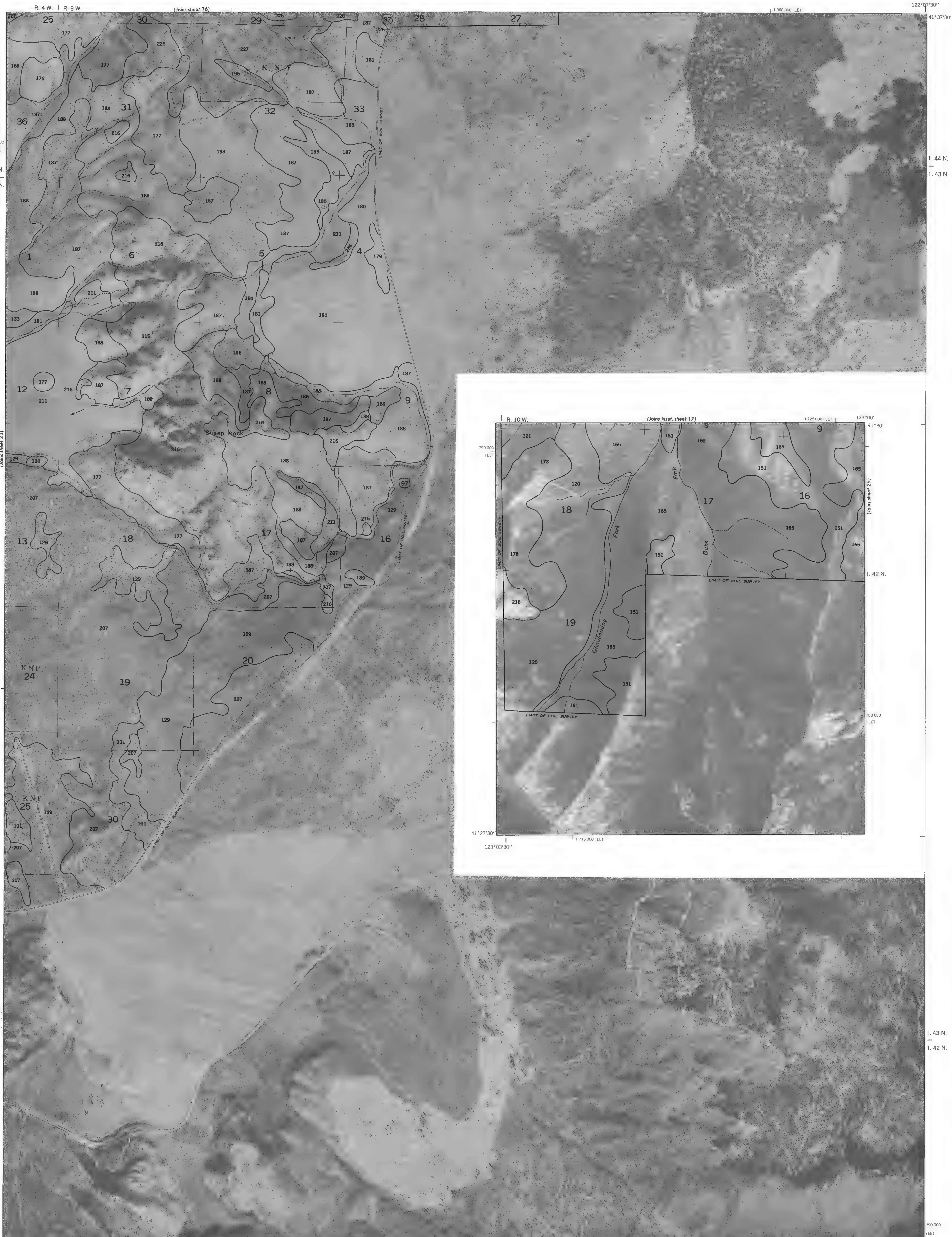

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24000

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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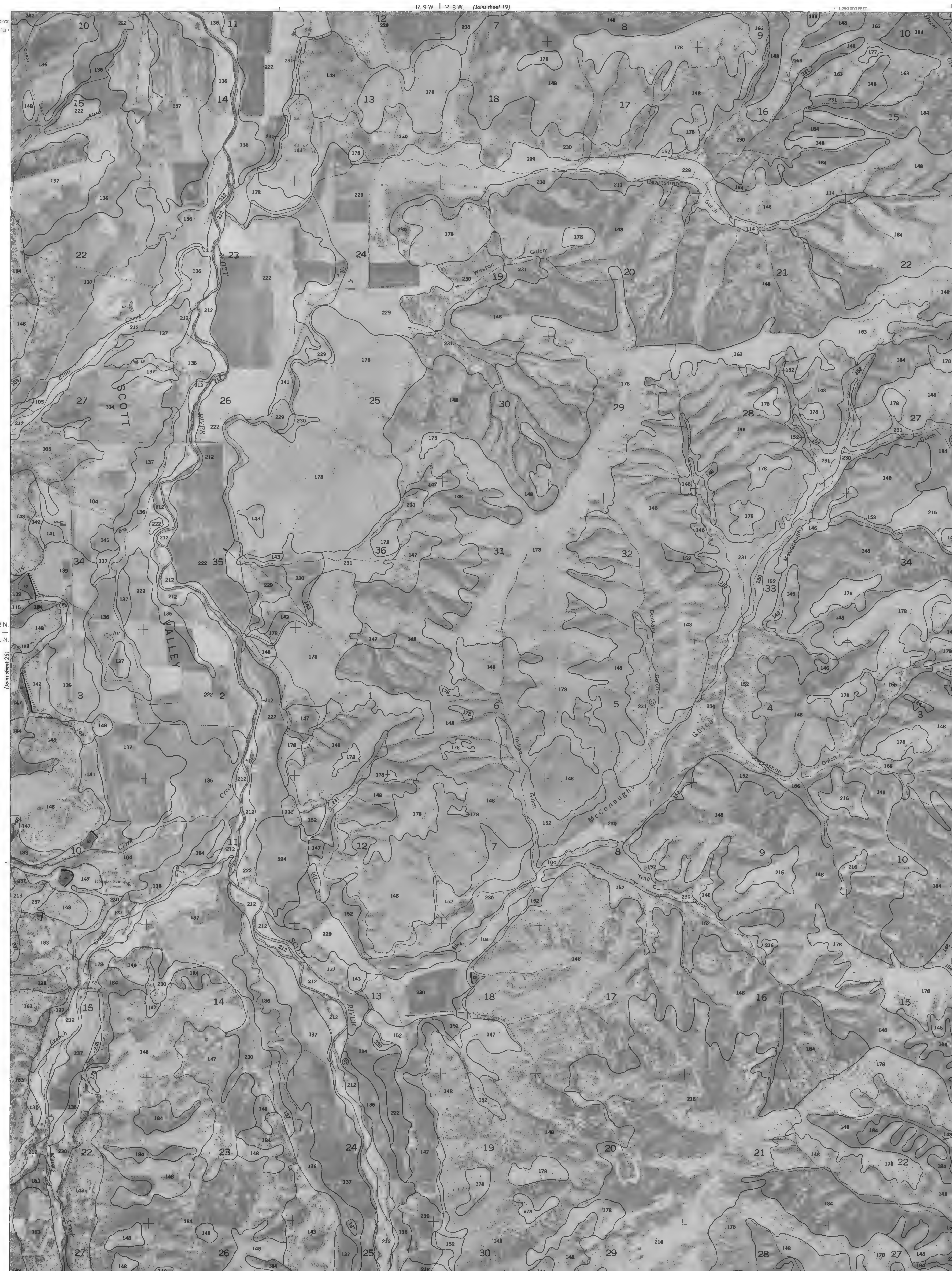

2 MILES
2 KILOMETERS
SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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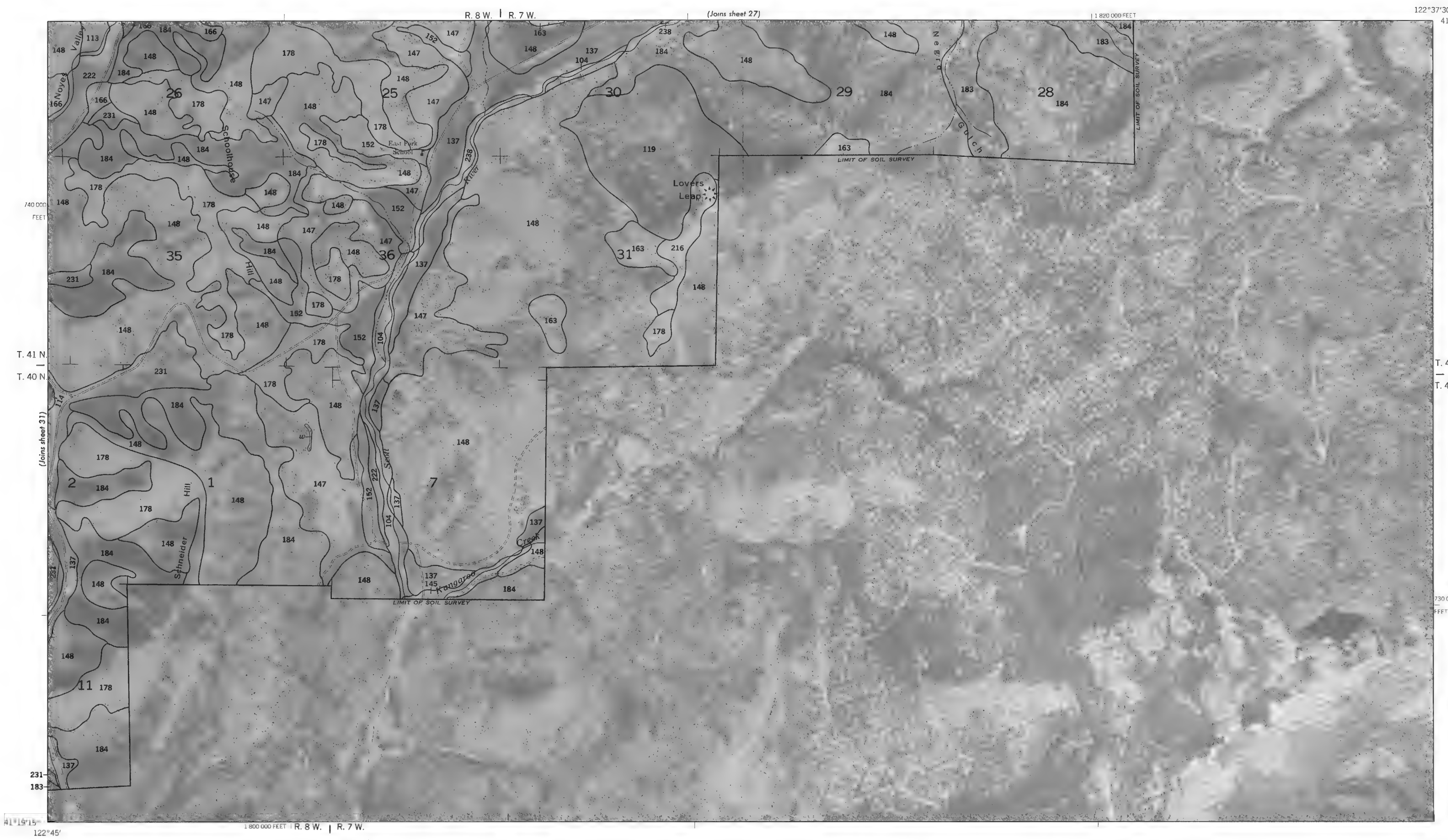
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

SISKIYOU COUNTY, CALIFORNIA, CENTRAL PART NO. 27



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24000

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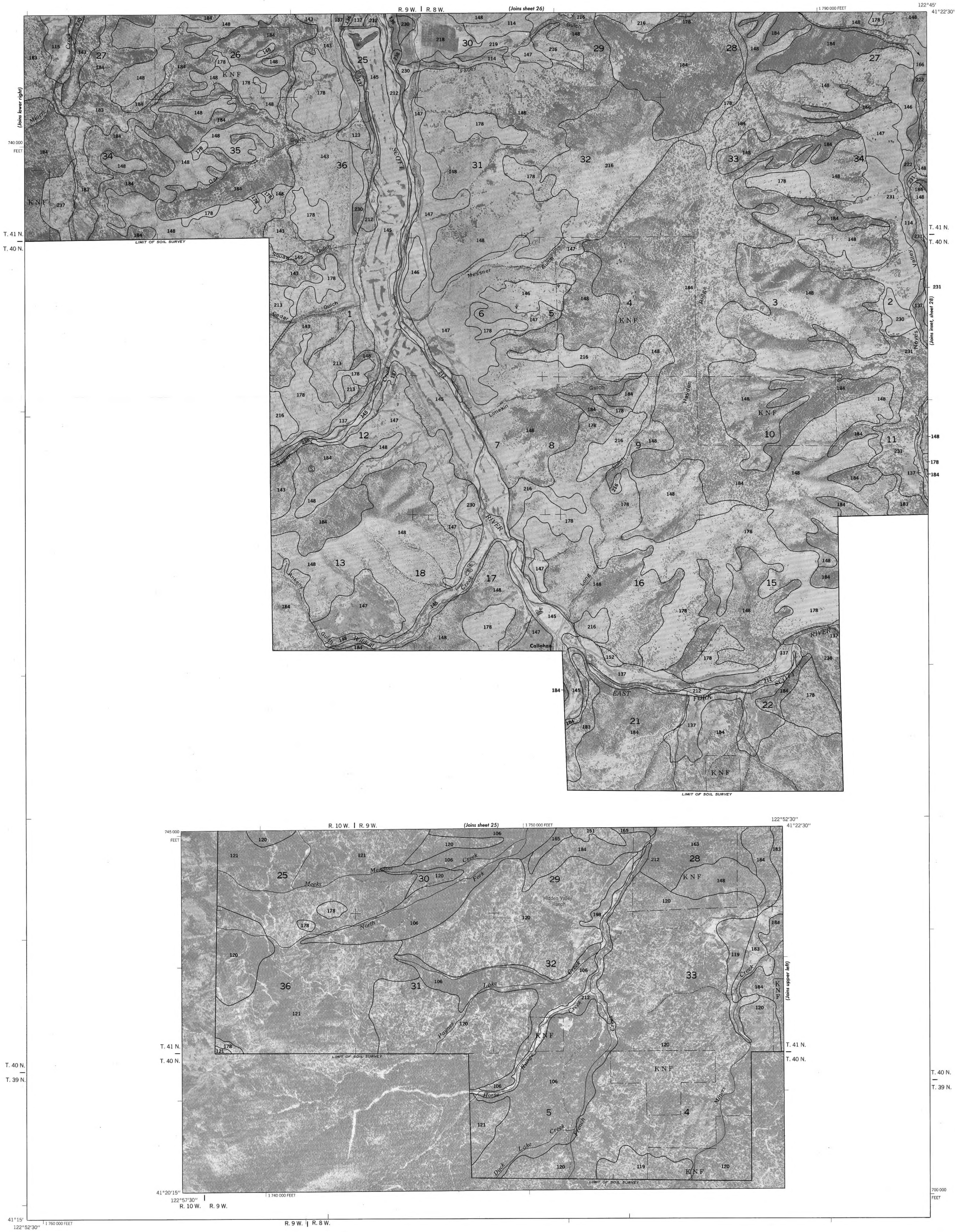
SCALE 1:24000



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24000

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